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The Railroads at the New York World's Fair 213

Featured in this 18-page section of the railway exhibit at the New York World's Fair are many historical locomotives (originals of several that played an important part in early development); "Building the Railroads"; the yard exhibit of equipment used in the period from 1850 to 1900; "Railroads at Work"; the pageant of railroad history, "Railroads on Parade," and, finally, the track exhibits.

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GIVES FREIGHT A SMOOTH RIDE

The SIMPLEX SNUBBER is easily inspected

Advantages

- Rugged construction
- No "weak" parts
- Gives an easy ride
- Easily inspected
- Assembly "interlocks"
- No bolts required
- Easily taken apart

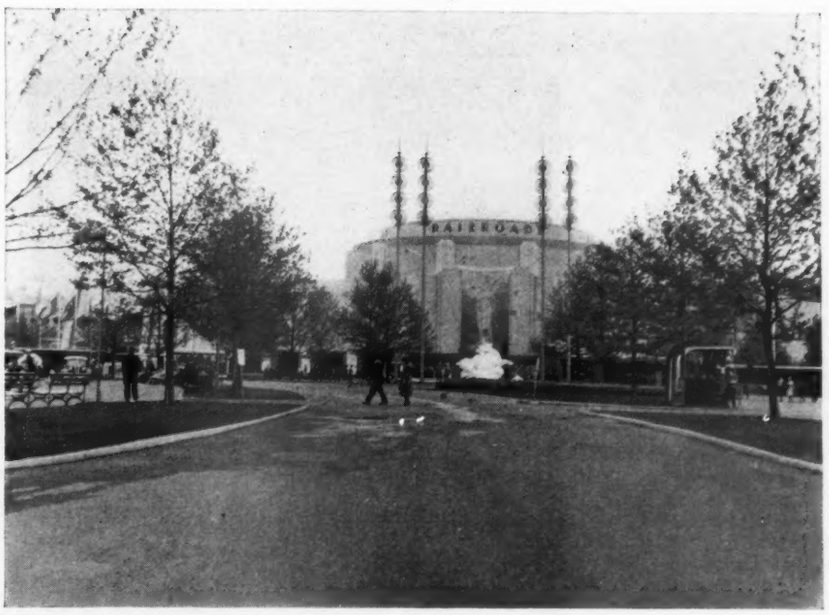
The friction members of the Simplex Snubber are "out in the open," where they may be easily seen and inspected. In fact, *all* the parts of this Snubber are in plain view, as is evident in the illustration.

Simplex Snubbers retain their ability to effect a smooth and easy ride throughout their long life. Many of them have already given over 100,000 miles of service and the rate of wear indicates an ultimate life of 200,000 miles or more.

AMERICAN STEEL FOUNDRIES

SIMPLEX ...The Long Lived SNUBBER

THE RAILROADS AT THE NEW YORK WORLD'S FAIR



Spread out over an area of 17 acres in the northwest corner of the New York World's Fair grounds is a group of exhibits which tell the story of the railroad industry from its pioneer days to the present time. At an expenditure estimated to be close to five million dollars, 27 railroads of the Eastern Presidents' Conference have collaborated in the building of the largest exhibit at the Fair.

By the time the visitor has passed through the exhibit from the entrance of the Railroad Building to the last car and locomotive on the track he has seen a picture of the railroad business in its entirety. The rotunda contains, among many historical models, the originals of several locomotives that played an important part in early development. Then comes "Building the Railroads"; the yard exhibit of equipment used in the period from 1850 to 1900; the immense model railroad operation, "Railroads at Work;" the pageant of railroad history, "Railroads on Parade," and finally the track exhibits. The story of this show is told in pictures on the next 17 pages of this issue.

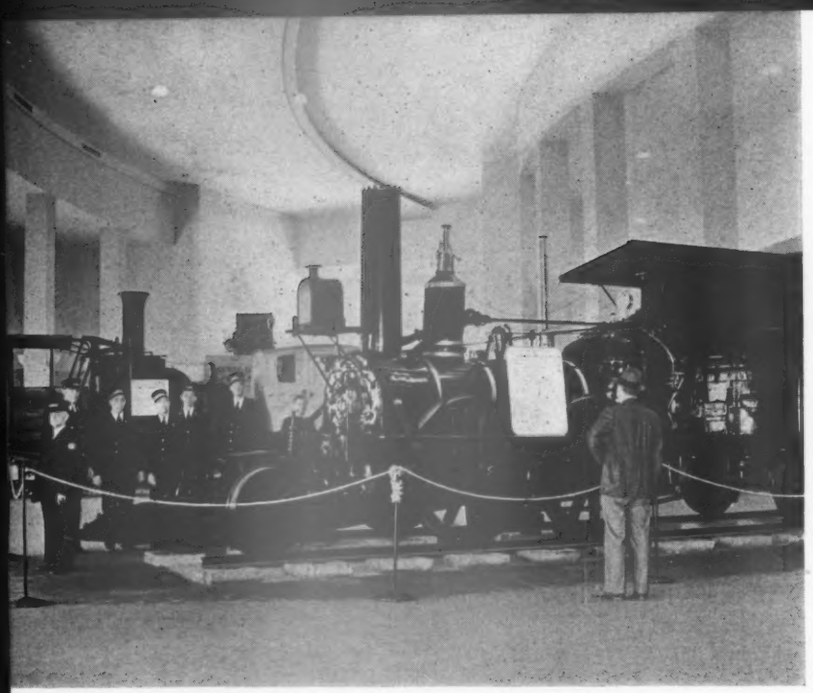
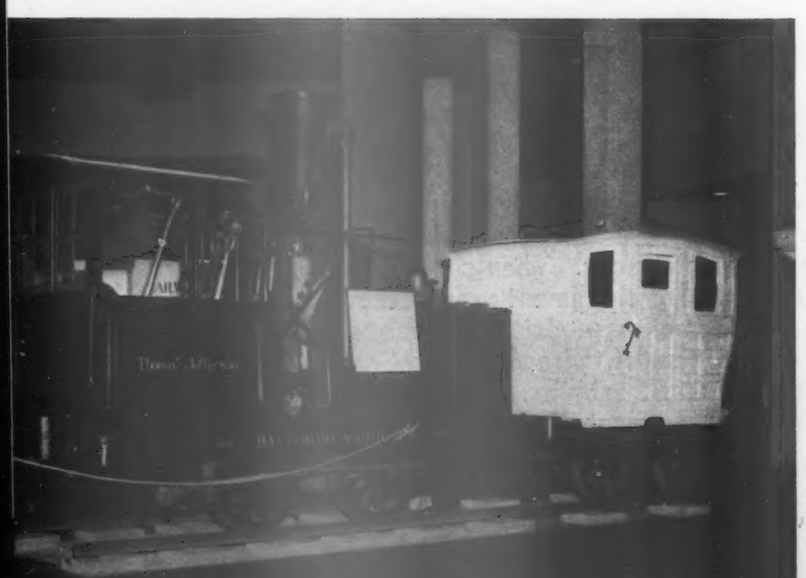


Photo by F. Allen Morgan

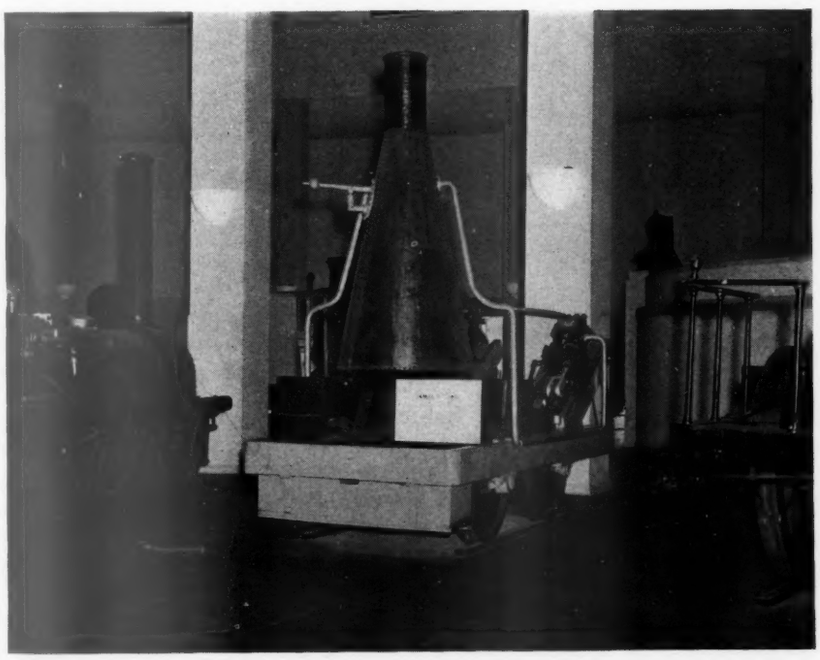
The "John Bull" is the oldest complete locomotive in America and was built by Robert Stephenson and Company, England, for the Camden and Amboy Railroad. The locomotive was completed in May, 1831, and shipped from Liverpool in July of that year. It was placed in service November 12, 1831

The Mercury—A 2-2-0 type English locomotive built about 1830 by George Stephenson embodying the best features of the Planet type locomotive which was popular at that time. This locomotive has one pair of drivers with a single pair of front wheels in main frame pedestals supported on springs

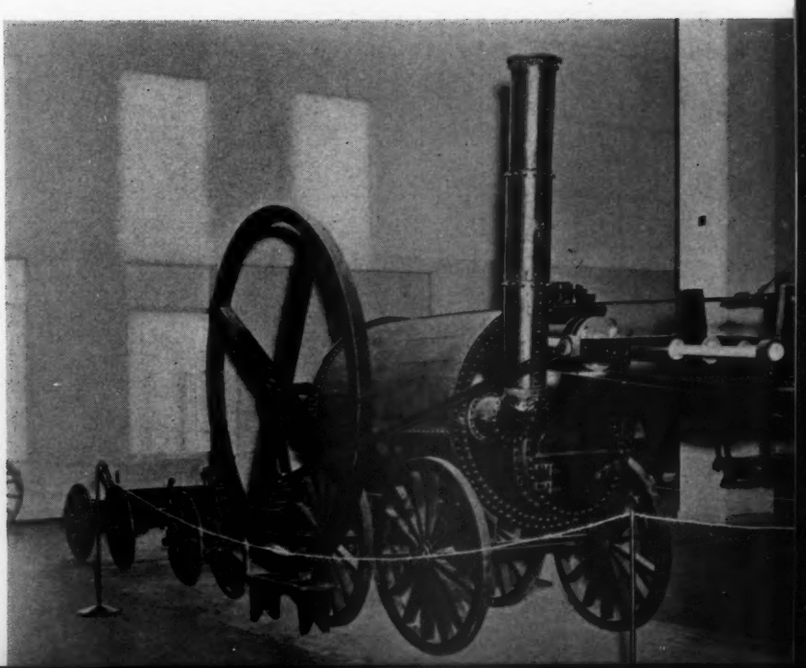


This early locomotive, the "Thomas Jefferson", taken from the Baltimore & Ohio historical collection was built by Davis & Gartner in 1834 and was in use until 1893. It was the first locomotive to operate in the State of Virginia (1835). The total weight is 28,900 lb.

Brunton's Steam Horse, patented by William Brunton, an Englishman, in 1813. It is a horse-leg locomotive. The rear knuckle rods with their iron-shod feet are operated by horizontal cylinders like horses' legs to push the engine forward. Slow speed and lack of adhesion defeated the idea



James II—A modification of an earlier engine employing a larger boiler, built by William T. James of New York in 1831. It employed inclined cylinders and was equipped with link-motion valve gear. It was purchased by the Baltimore & Ohio and was used until the latter part of 1836

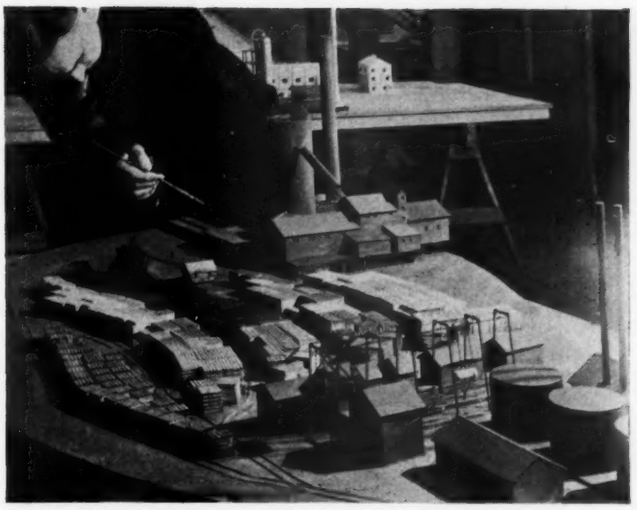


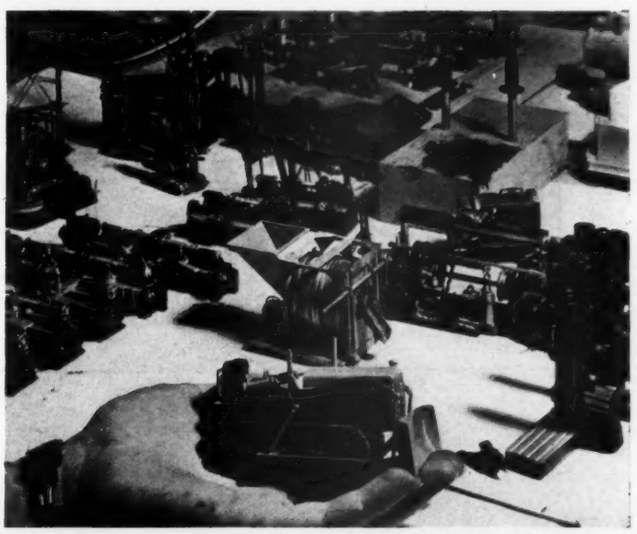
Trevithick's Newcastle—Built by Richard Trevithick in 1805. This builder of stationary engines and advocate of higher boiler pressure built a number of models to demonstrate his theory. This locomotive was constructed and successfully operated at New Castle, England

BUILDING THE RAILROAD

How Railroads Are Built

Under the dome of the railroad building the industries which supply the railroads, represented by 634 companies, have joined forces to erect an animated cyclorama, mountainous in design, which is 80 feet at the base and 28 feet in height. On this model is demonstrated the actual construction of a railroad and its equipment. As one enters the exhibit and walks up the circular ramp, at the base of the mountain, he sees first, in miniature, the construction of a roadbed, trestle and tunnels—all of which is illustrated with moving graders, pile drivers, cranes, etc. Beyond the dividing ridge in the mountain is located the locomotive shop, which is open to show the operations going on inside. Here are shown the various steps, from the casting of the beds to the setting of the "pops." Behind the shops are a miniature steel plant and rolling mill and an open pit ore mine with machinery in full operation. At the summit of the ramp the visitor may view the extraction and processing of railroad fuel and maintenance products in scattered model units. Along the immediate foreground, one may look into the insides of the passenger car building and repair shop and, further along, see the spot-system building of freight cars. These latter shops, for convenience in arrangement of the model, have been located in what will be recognized as the manufacturing zone of a large city, wherein are located accessory plants to show the production of glass, textiles, etc. All through the entire exhibit a complete railroad system operates, with its yards, signal systems, enginehouses, bridges, snow sheds, and tunnels. Freight and passenger trains rush by, first on tracks in the open and then through tunnels in the mountain. The ramp finally leads into the 10,000 square-foot area beneath the mountain where other exhibits supplement the story told on the outside





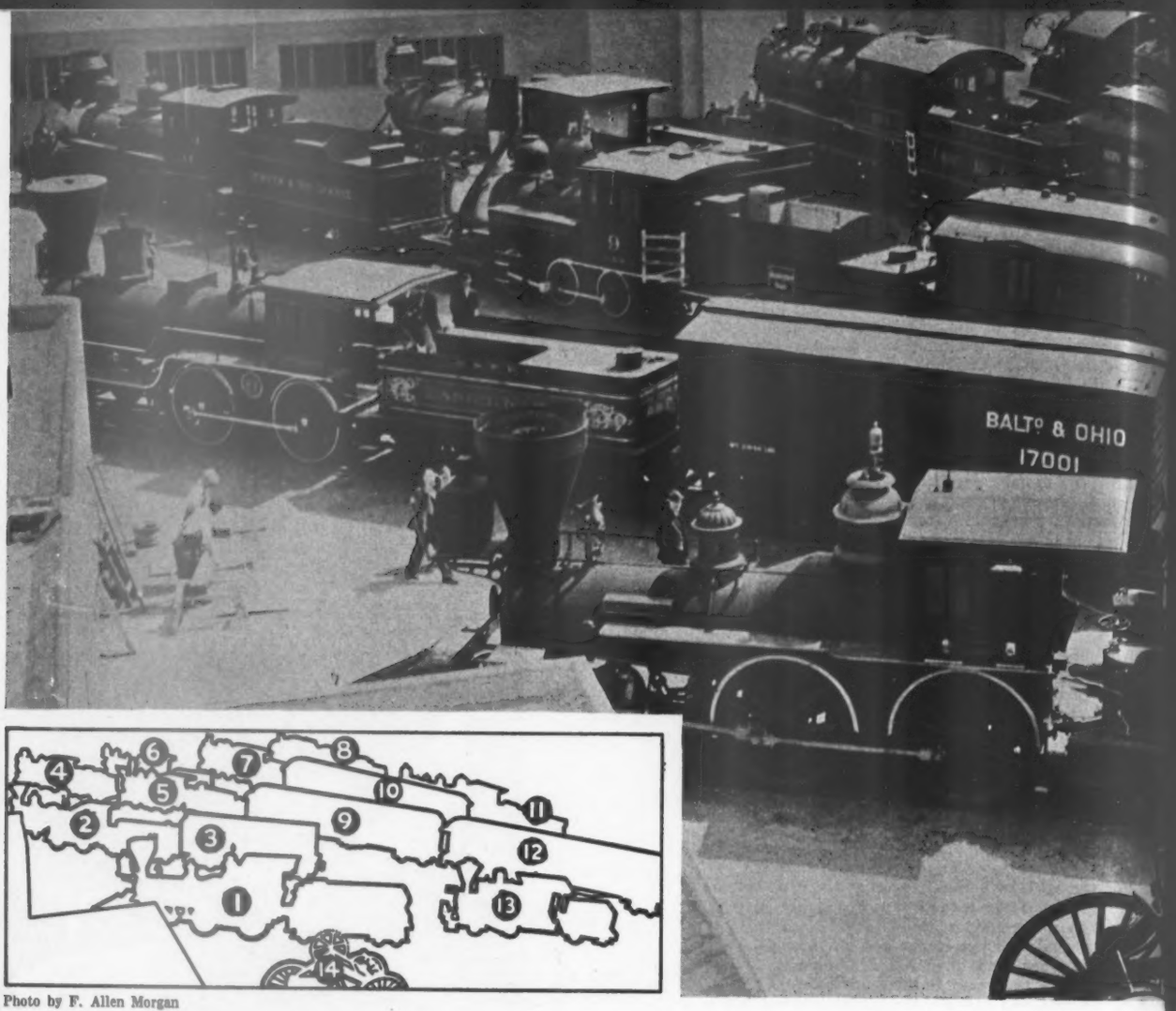
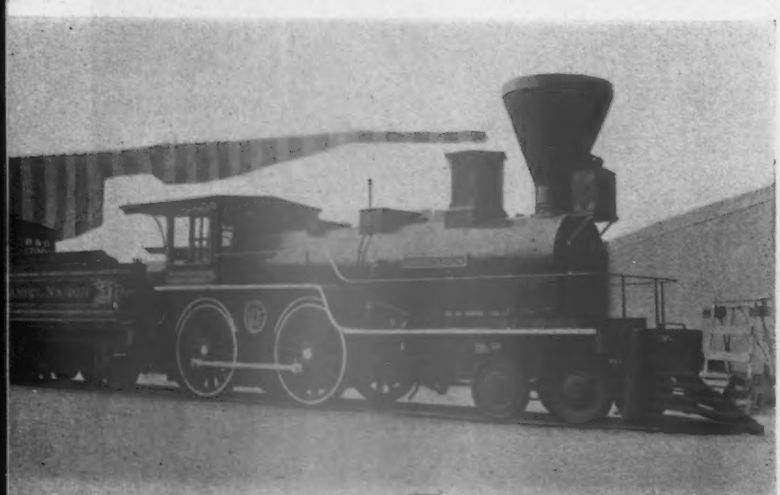


Photo by F. Allen Morgan



Left: The well-known "General" of the Western and Atlantic was involved in an historical and unusual episode of the Civil War just outside of Atlanta, Ga. It was stolen by a group of Union soldiers and ran for many miles before recapture by the Confederates—Lower left: The "Daniel Nason" was built in 1856 for the Boston & Providence (now part of the New Haven) and was named after a famous Maine sea captain; below—another view of the narrow-gage units in the yard area, numbered 4, 5, 9 and 12 in the large picture

Historical Equipment in the Railroad Service Exhibit

(1) Western and Atlantic locomotive the "General"—(2) Boston and Providence locomotive, the "Daniel Nason"—(3) Baltimore & Ohio iron box car used during the Civil War to transport gun powder—(4) Denver & Rio Grande locomotive No. 169, a narrow-gage unit of the early '70's—(5) Colorado & Southern (now part of the Burlington system) No. 9, a 2-6-0 locomotive—(6) The Baltimore & Ohio J. C. Davis—(7) New York Central No. 999—(8) Delaware, Lackawanna & Western No. 952, a 4-4-0 type camel-back passenger locomotive—(9) Colorado & Southern narrow-gage mail and express car—(10) B. & O. Royal Blue Line coach—(11) Boston & Maine 4-4-0 type passenger locomotive—(12) C. & S. narrow-gage coach—(13) Northern Pacific 0-4-0 locomotive "Minnetonka"

Right: Baltimore & Ohio 2-6-0 type locomotive "J. C. Davis" which was built in 1876 and acclaimed at the Centennial Exposition of that year the largest locomotive in the world—It weighs 153,000 lb.—Lower right: New York Central No. 999, built at West Albany in 1893 and piloted by Engineer Charles Hogan on a record-breaking run during which it is credited with attaining a speed of 112½ m. p. h. Other units not in the pictures are the Hannibal & St. Joseph mail car and a car used in 1827 at Quincy, Mass., for hauling granite

TO DO FULL HONOR TO
THE AMERICAN RAILROAD
in more than One Hundred Years of its Triumphant Success there will be presented Each Day at the
NEW YORK WORLD'S FAIR - 1939
a huge dramatic SPECTACLE of Growth & Achievement with Words by Edward Hungerford & Music by Kurt Weill & employing a cast of 250 Men & Women, 50 Horses & 20 LOCOMOTIVES, Old & New, all operating under their own steam
RAILROADS ON PARADE
The ENTIRE PRODUCTION will be one of Sumptuous-Magnificence on a scale never before conceived & employing every Modern Method of the Theater to present a Picture of Great STRENGTH & BEAUTY-HUMOR & ACHIEVEMENT upon the Largest Stage ever builded in NEW YORK & facing an Amphitheater — enclosed & seating 4000
When You come to The FAIR - You cannot afford to miss the 17-acre EXHIBIT of the RAILROADS & this Triumphant Rail-Pageant
"RAILROADS - ON - PARADE"
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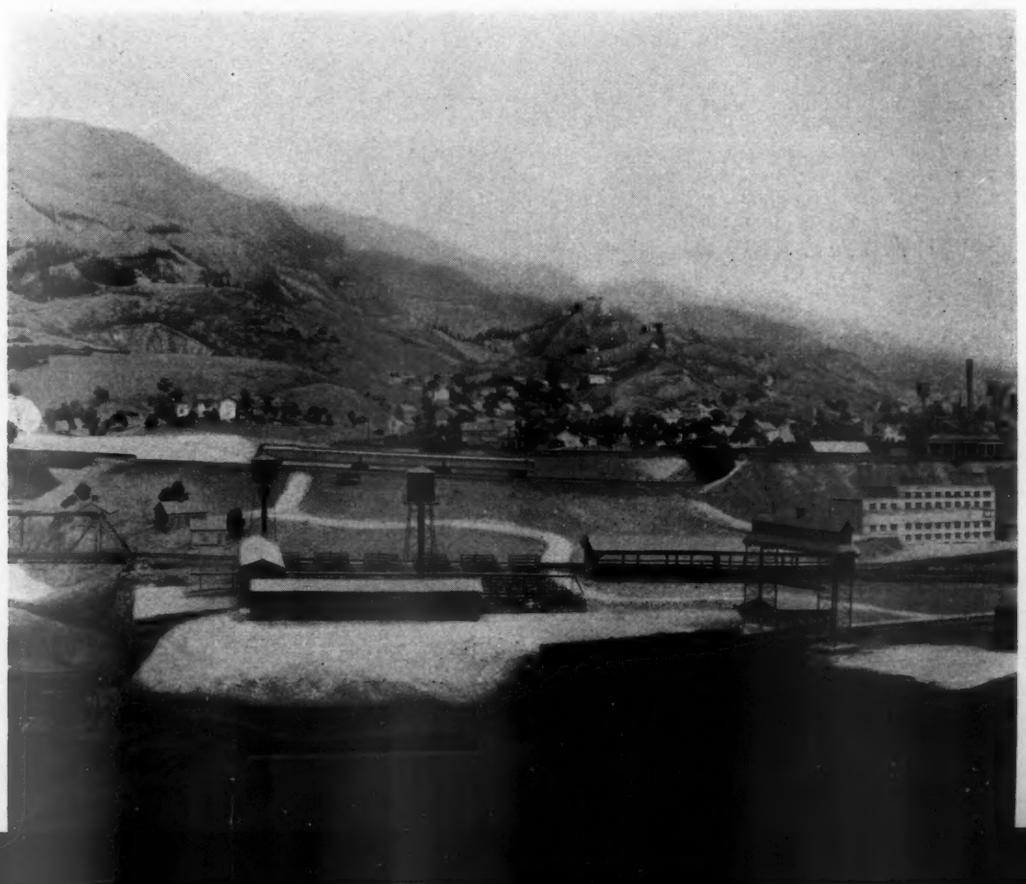
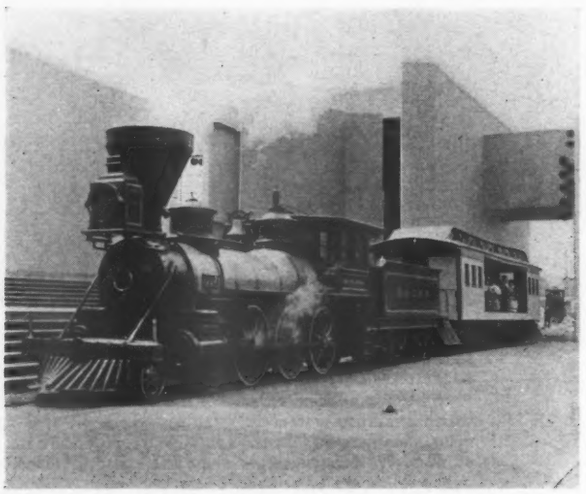
RAILROADS
ON PARADE
AND
RAILROADS
AT WORK
THIS WAY

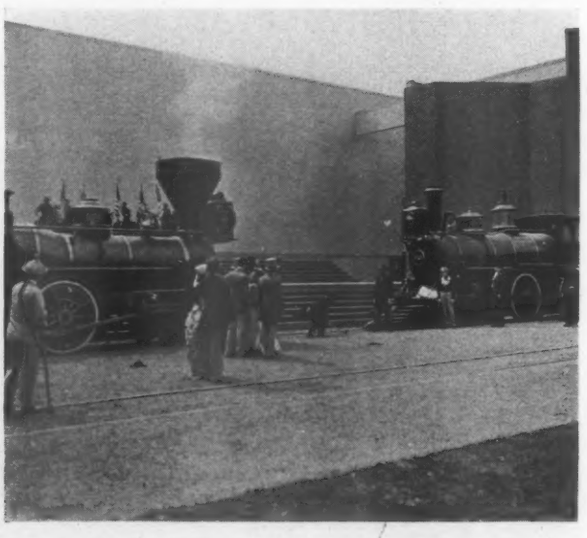
In a building of its own, seating 1,000 persons, within the railroad building, skilled model builders have built a huge diorama and scenic setting. Over 1,000 buildings, in miniature, have been assembled to make the cities and towns in this 40-ft. by 160-ft. area through which a railroad system operates with 3,500 ft. of O-gage track, and 500 pieces of equipment, including 50 locomotives. The signal and control system required three million feet of wire. Performances are given every hour and last for 35 minutes. These show practically 24 hours of railroad operation under actual conditions of daylight and darkness



RAILROADS C

Photo by F. Allen Morgan

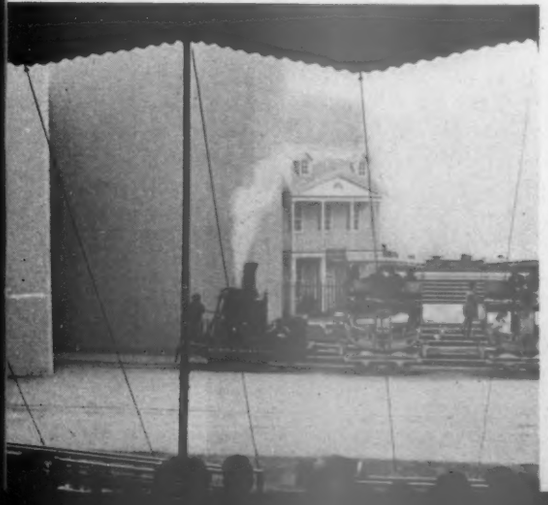




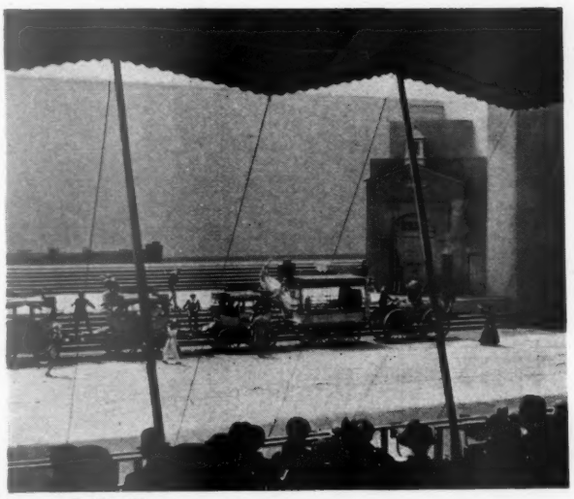
This pageant of the railroads, a creation of Edward Hungerford, tells the story of transportation from the days of the covered wagon to the streamline trains of the present. The spectacle is presented on a three-level stage 250 ft. wide by 100 ft. deep. The forestage not only contains two standard-gage tracks adequate to support the largest modern locomotives but is paved with a gravel mixture to accommodate the horses and wagons which appear in the several scenes. Turntables, on the stage at either side, make rapid changes of scenery possible so that buildings, representative of the era of the scene, may form a part of the whole setting. Following the prologue—before the coming of the railways—Act I opens with a scene at the Battery in the City of New York upon the occasion of the opening of the Erie Canal, followed by the appearance of the first locomotive to run in America, the Delaware and Hudson's "Stourbridge Lion" (upper left), which made its debut at Honesdale, Pa., in August, 1829. In succession, as the show proceeds, appear the pioneer engines of the American railroad, the "Best Friend of Charleston," which ran on the South Carolina Railroad in 1830, the "De Witt Clinton" of 1831 (upper left, opposite page) and Peter Cooper's "Tom Thumb" (lower left, opposite page) which appeared in Baltimore in the spring of 1830. Act III opens up with a scene on the Overland Trail in 1849 and continues, in the second scene, with the occasion of President Abraham Lincoln leaving New York in February, 1861, on his way to the inauguration in Washington. Here appears the locomotive "William Crooks" and train, which enact the role of the Lincoln train. This locomotive recently made the trip from St. Paul, Minn., to the World's Fair at New York under its own steam. In the final scene of this act the locomotive "Genoa" (1871) of the old Virginia and Truckee Railroad appears for its contemporary, the "Jupiter" of the Central Pacific along with the No. 119 of the Union Pacific (these are shown in the lower left-hand picture on this page)

(*Continued on opposite page*)

Photo by F. Allen Morgan



S ON PARADE



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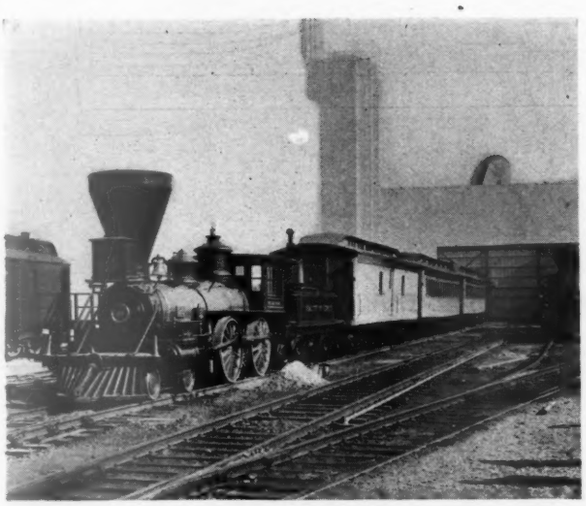
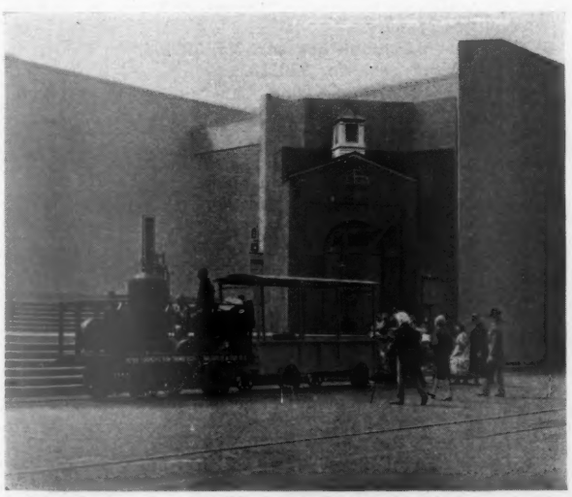
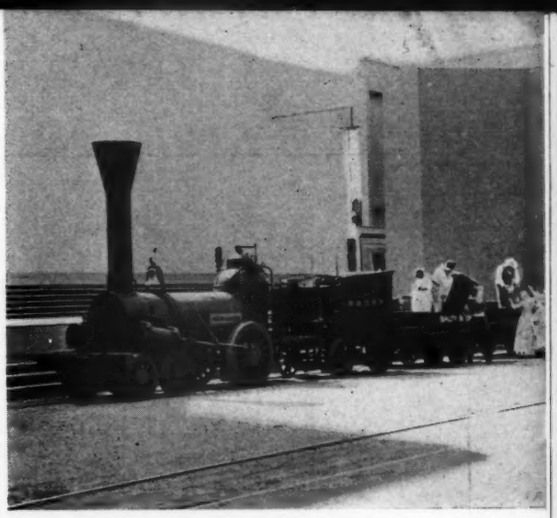
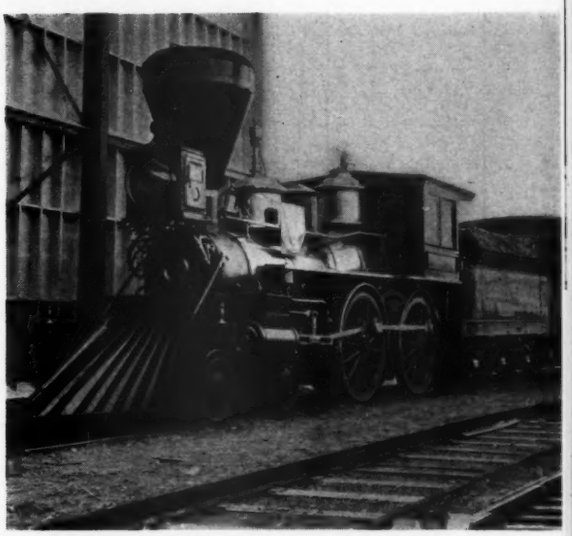
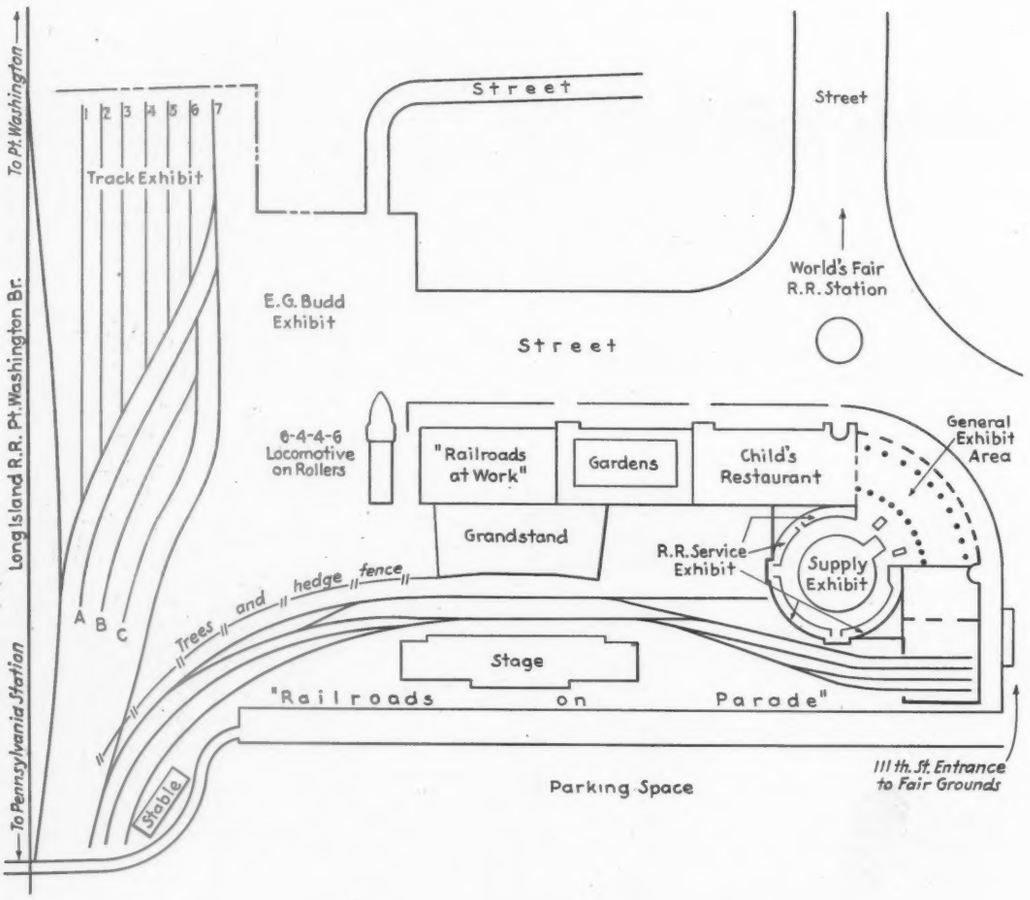








The first scene of the fourth act of the pageant is laid in the depot of almost any small American town of the '70s. The townspeople have gathered in force to await the arrival of the morning train, which, in this instance, is enacted by the Baltimore & Ohio's locomotive "Wm. Mason" and B. & O. cars. (While the picture of the actual scene does not appear on this page the locomotive and cars are shown in the center picture at the left.) This is followed by an old day coach of the '70s, the near side of which has been cut away to show the arrangement of its interior and the action of the players in the scene, drawn by the B. & O. locomotive "Thatcher Perkins" (upper right, opposite page). Other historical locomotives which appear in the show are the B. & O. "Atlantic" (1832), the "J. W. Bowker" (1875), and the Ross Winans" 1869. Toward the close of the pageant the Pullman Company's lounge car "Luxuryland" takes part in a scene developed to show the comfort and convenience of modern travel and, at the very end, two of the latest steam locomotives are run onto the stage from either side and come to a stop, pilot to pilot, at the center. These modern examples of passenger power are selected from the equipment of the Eastern railroads and are changed from month to month. During the month of May the restyled Delaware, Lackawanna & Western 4-6-4 type No. 1939 and the Pennsylvania streamlined Pacific No. 3768 were used to ring down the curtain on the 45-min. show. During June the New York Central's "Commodore Vanderbilt," a streamline Hudson type, teams up with the Pennsylvania No. 3768. July and August will feature the Canadian locomotives which drew the royal train



DIRECTORY OF EXHIBITS ON THE TRACKS

Track 1

London, Midland & Scottish train, "Coronation Scot". (Locomotive and eight passenger cars.)
New York Central mail car No. 4868.

Track 2

Italian State Railways
- Three-car electric train—express service.
- Two-car electric train—local service.
- Gasoline-engine-powered rail car.
- Road-rail freight-car transport truck.

Track 3

New York Central class J3a (4-6-4 type) locomotive, No. 5453.
N. & W. articulated passenger locomotive, No. 1206.
General American Transportation Corporation all-welded box car, No. 1940.
General American Transportation Corporation 10,000-gal. tank car, No. 1940.
Erie automobile car, No. 96999, with auto loading racks
N. & W. 55-ton hopper car, No. 38288.
D. & H. all-welded hopper car No. 4651.

Track 4

P. R. R. class M1a (4-8-2 type) locomotive, No. 6759.
D. L. & W. 70-ton cement car, No. 1939.
Lackawanna refrigerator car, No. LRX1939.
Bangor & Aroostook box car, No. 4566.
Nickel Plate box car, No. 87066.
C. & O. gondola, No. 44724.
Lehigh Valley caboose, No. 95065.

Track 5

P. R. R. electric locomotive, Class GG1, No. 4888
P. R. R. stock car, No. 134124.
P. R. R. hopper car, No. 676314.
P. R. R. depressed-well flat car, No. 470090.
P. R. R. flat car, No. 470200.
P. R. R. flat car, No. 474415.

Track 6

B. & O. passenger locomotive "George H. Emerson", (4-4-4-4 type), No. 5600.
B. & O. covered-wagon box car, No. 380164.
B. & O. cement car, No. 630200.
B. & O. caboose, No. C-2502.

Track A

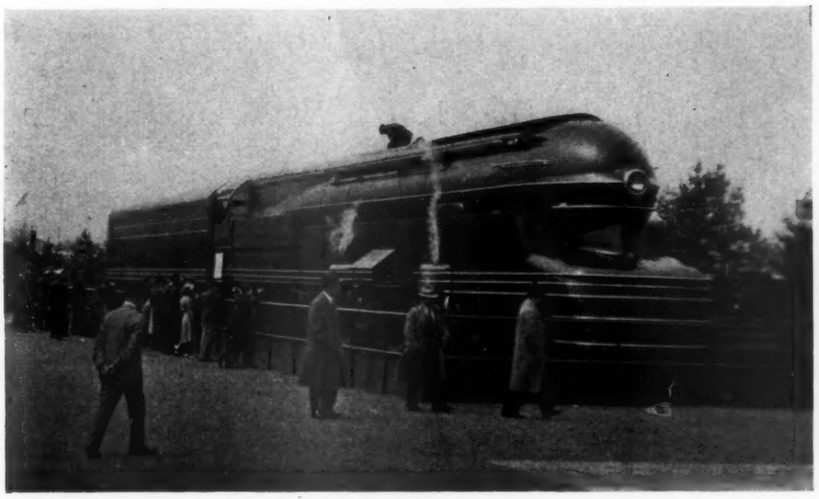
Pullman Company
- Light-weight room-observation sleeping car
- Light-weight Roomette sleeping car
- Light-weight duplex bedroom car.
- Standard section room sleeping car.
- Tourist section sleeping car.

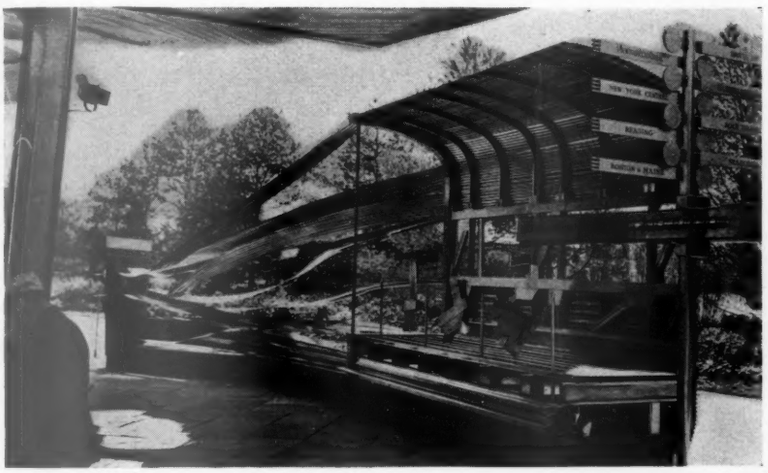
Track B

P. R. R. horse express car, No. 5824.
New Haven coach, No. 8501.

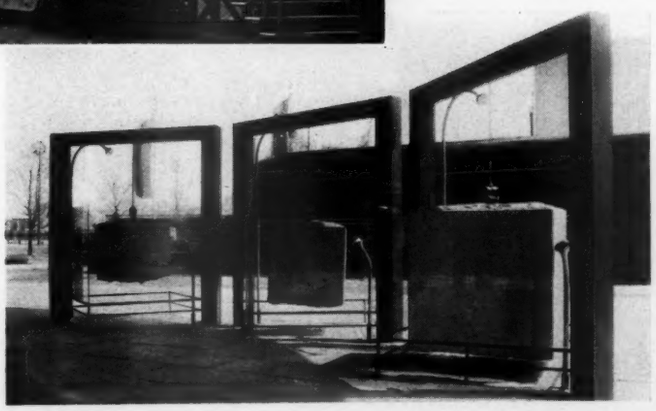
Track C

P. R. R. coach 4014.
New York Central diner-lounge car, No. 535.



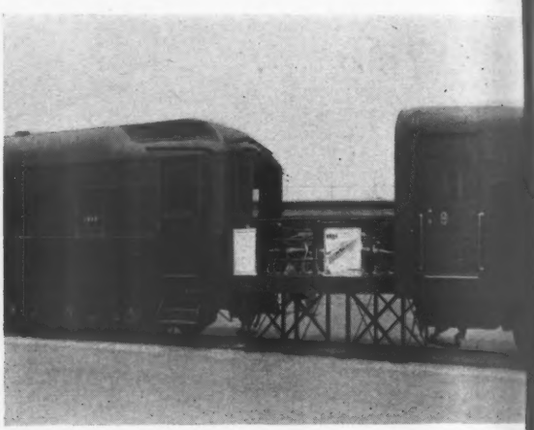


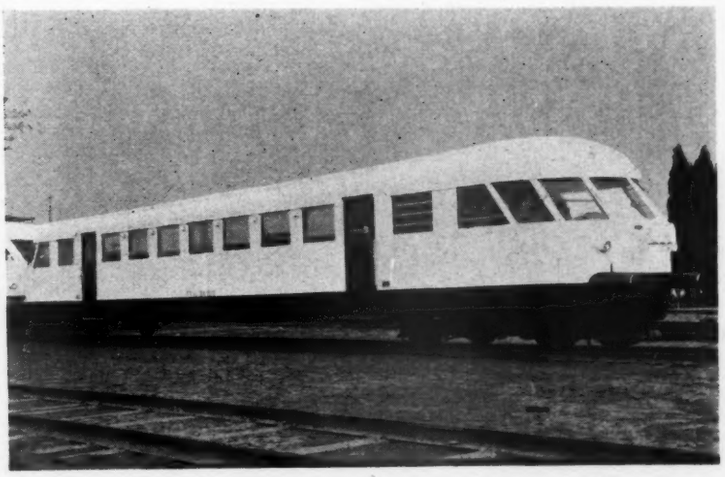
At the top is the new "American Railroads" 6-4-4-6 type locomotive which is operating under steam on a specially-designed roller "test stand" in which the power developed at the main drivers is used to generate the electrical energy which operates the truck wheels under the tender by means of traction motors. The engine truck wheels are belt-driven from main-driver rollers. At the left and below are four scenes in the Budd exhibit. Of these, the top is a portion of a longitudinal section of a Budd Shotweld passenger coach with the display arranged to show the method of forming the shapes from the strip stock. The two pictures in the center, below, are the exterior and interior of a Budd coach recently completed for the Pennsylvania. Bottom—A display designed to show the comparative strength of materials

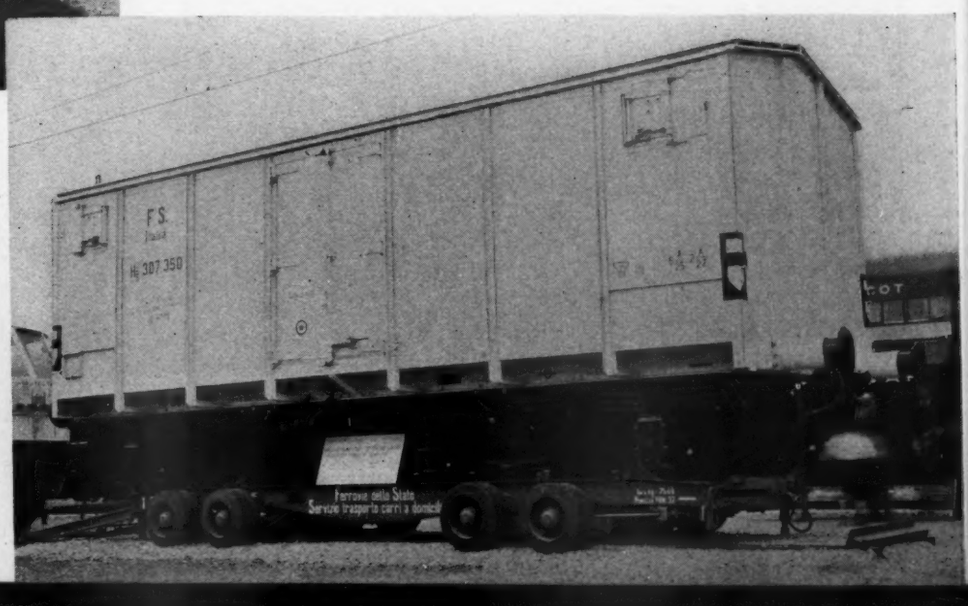


The Pullman Train

The four pictures on this page are scenes at the Pullman exhibit where five cars make up a train through which several thousand visitors are passing daily. The outstanding car in this exhibit is the room-observation sleeping car which represents the last word in Pullman accommodations. The two interior views below give an idea of the luxurious appointments of the observation end of this car. Two other cars in the Pullman train are the Roomette sleeping car similar to that exhibited in Atlantic City in 1937 and a duplex bedroom car. All three of these cars are of lightweight construction. A standard section, room sleeping car and a tourist section sleeping car complete the train. Below is the "sun-deck" at the middle of the train







The Foreign Equipment

The passenger equipment of the London, Midland and Scottish train "Coronation Scot" and the Italian State Railways (top picture) seems to be the starting place for track exhibit visitors. The Scot's locomotive and eight cars are an example of Britain's finest passenger equipment. The Italian exhibit is a three- and two-car electric train and gasoline-powered rail car. These are shown in the two pictures at the center of the page. At the bottom, right, is a highway truck designed for handling 31-ton railway cars. This is an Italian State Railways unit

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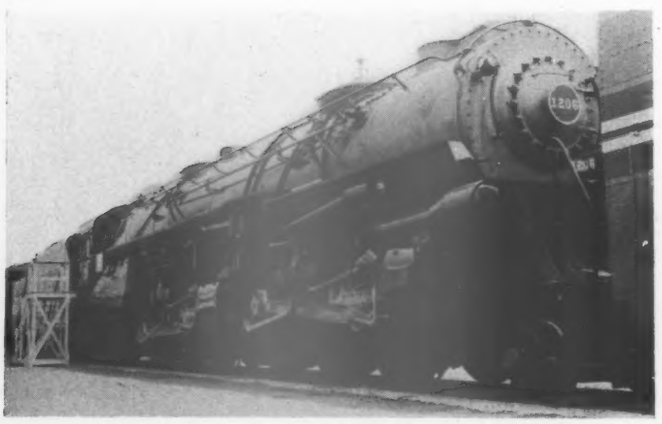

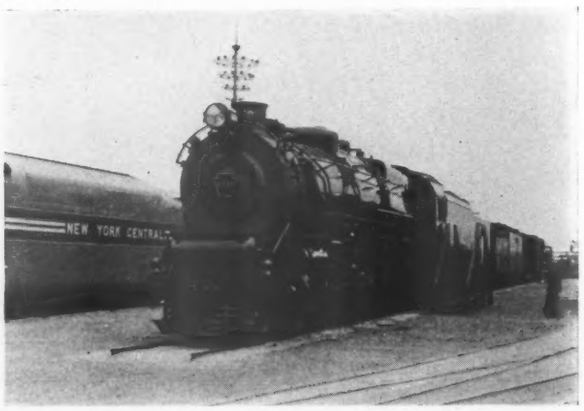
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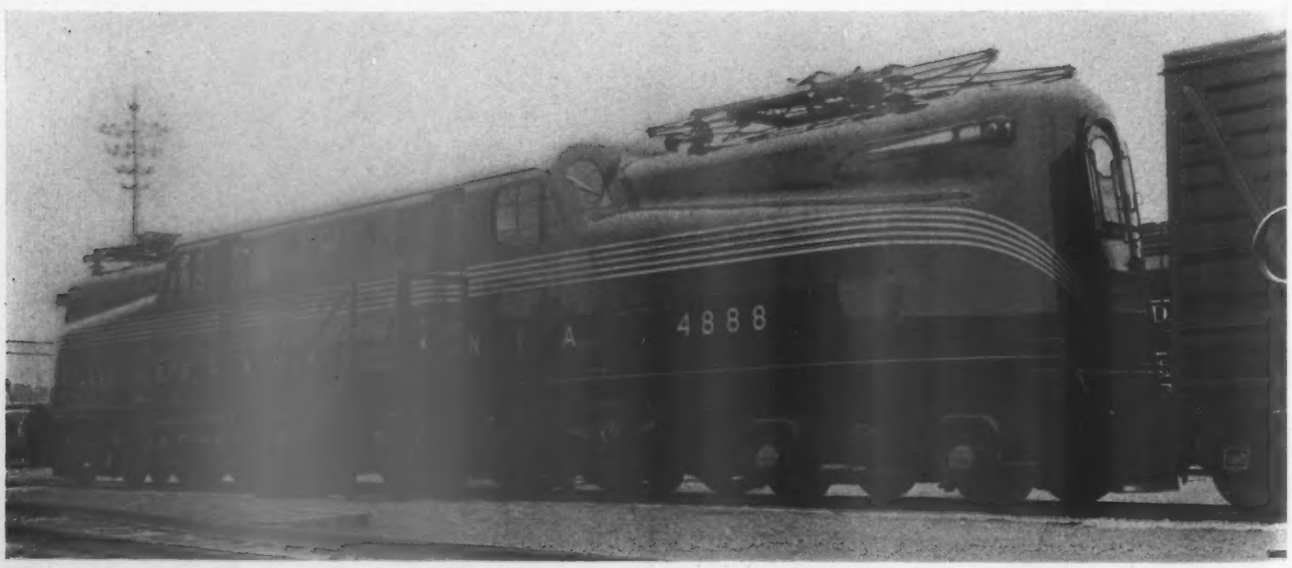
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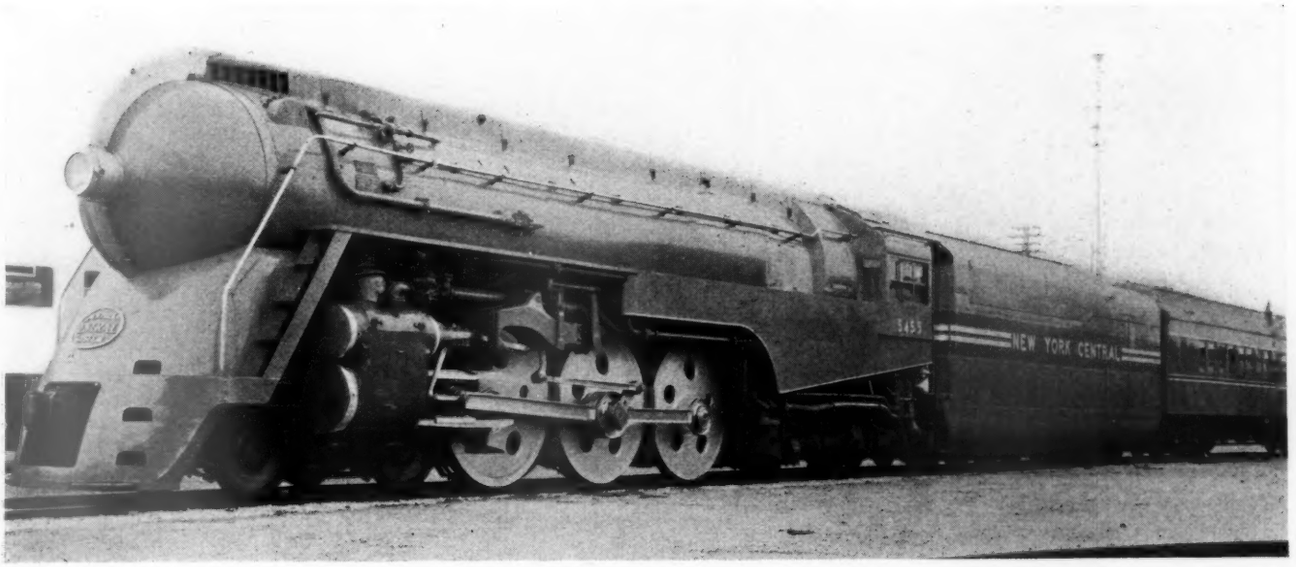
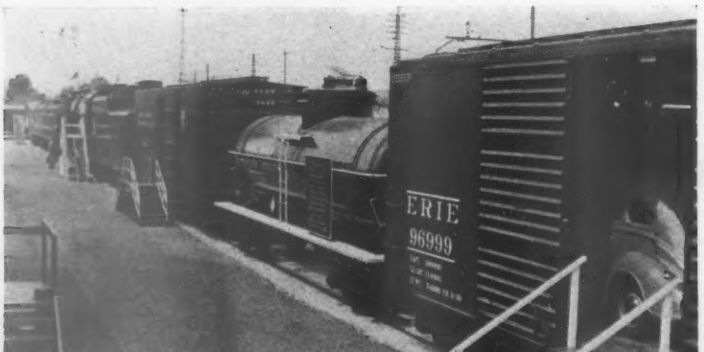


On these two pages appear some of the locomotives included in the track exhibit area. At the top of page 228 is the Baltimore & Ohio's 4-4-4-4 type passenger locomotive "George H. Emerson". This locomotive was exhibited at the 1937 convention at Atlantic City. At the left center of the page is the Norfolk & Western 2-6-6-4 articulated passenger and freight locomotive which has developed over 6,300 drawbar horsepower. At the right center is one of the Pennsylvania's 4-8-2 type steam locomotives and, at the bottom of the page, its electric companion, the type GG-1 passenger locomotive

On this page are two examples of modern railway passenger motive power. At the top of the page is the New York Central streamlined Hudson-type locomotive built in 1938 for service on trains such as the Twentieth Century Limited. These locomotives develop a tractive force of 55,540 lb. and a maximum drawbar horsepower of 3,380 at 65 m. p. h. At the bottom of the page is the Electro-Motive 4,000-hp. Diesel-electric passenger locomotive which is one of the features of the General Motors exhibit near the railroad building. The rear unit of this locomotive is glass-enclosed for public inspection

Above—Two of the units on the Baltimore & Ohio track are the covered-wagon box car and a covered cement car. Left—In the forground is a Pennsylvania well car having a capacity of 250,000 lb. In the background, a Nickel Plate box car and Chesapeake & Ohio hopper car



Above—In the foreground is an Erie automobile car with auto loading racks, and beyond, two General American exhibits, a 10,000-gallon tank car and an all-welded light-weight box car. Right—An all-steel, insulated caboose with cushion underframe, placed among the exhibits by the Lehigh Valley

EDITORIALS

Railroads at the New York World's Fair

In a number of pages in this issue we have attempted to give our readers some impression of the character of the railway transportation exhibits at the New York World's Fair. For those who will attend the annual meeting of the Mechanical Division, Association of American Railroads, which will be held at New York during the last week of June, these pages will serve as a brief catalog of the material available for their inspection. For those who do not expect to see the exhibit, we hope that our presentation may be of interest not only for the items of railway motive power and rolling stock which it presents, but also for something of the atmosphere of the fair which has influenced not only the character of the exhibit, but also the way in which it has been presented.

The theme of the fair is the World of Tomorrow. The railroad exhibit, unlike some of the exhibits, presents the best in the way of railway transportation in the world of today which, in the final analysis, is all that we can be sure of in the world of tomorrow, and presents it against a background of the yesterdays of which it is the direct descendant. Whether or not this method of presentation is leading the public who see it to better understandings or interpretations of modern railway transportation, it is certainly attracting wide interest and attention among thousands of visitors daily.

The railway exhibit is but one of the forms of transportation which are included in the transportation area at the fair. For the railway officer who has sufficient interest in learning what the public wants and how the public feels in matters of transportation to become a student of popular psychology for half a day, a careful observation of the public interest in the various exhibits and the expressions concerning them made by World's Fair visitors may well be of as great value as a study of the exhibits themselves.

The Boiler-Patch Competition Closes

In our March issue we announced a competition for concise articles describing the most interesting problems of patching locomotive boiler sheets within the experience of the contestants. The articles were to deal with either interesting methods of applying patches or with interesting problems of patch design, or both.

On May 15, when the competition closed, twenty-eight entries had been received—gratifying evidence that the subject is of interest to our readers. These are now being studied for the selection of the prize winners. We will announce the names of the winners in the August issue and will also publish the first prize-winning entry at that time.

Deflection Under Load

An engineer is commonly considered to be a man who knows how to utilize materials and natural forces with maximum efficiency in the service of man, and, in this connection, it may be said that no one has surpassed the railway engineer in achieving the highest objectives of his profession. Constant problems arise in the use of new materials which involve not only an accurate knowledge of the physical characteristics of these materials but the exercise of good judgment backed by extensive practical experience in applying this knowledge. Probably the principal difficulty is to determine what are the real facts in any specific problem under consideration and see how these facts check with certain time-tested fundamentals which form the basis of all satisfactory design.

For example, in spite of the extensive use of alloy steels in railway service for many years, one steel manufacturer reports that occasional questions indicate some misunderstanding of the relation between such common characteristics as stiffness and strength; also some uncertainty regarding the relative action of various steels when deflected under load. To throw light on these questions and demonstrate how different steels perform under actual test conditions, three ½-in. square steel test bars, made of annealed low-carbon steel, heat-treated high-carbon steel and heat-treated alloy steel, respectively, were separately placed between knife-edge supports 10 in. apart on a test machine and subjected to variable loads, or pressures, applied at the center. The curves of load in pounds, plotted against deflection in inches, were identical for all three test bars up to about 500 lb. when the soft carbon steel started to take a permanent set. At approximately 1,600 lb., permanent deformation began in the high-carbon-steel bar, whereas this point was not reached in the alloy-steel bar until a load of slightly over 2,200 lb. was applied.

The well established but sometimes misunderstood relationship between stiffness and strength, as again demonstrated by this test, cannot be better discussed than in the following statement by the steel maker referred to: "Within the elastic limit, only the modulus of elas-

ticity of a material has any effect on stiffness (resistance to deflection) of a beam or bar. Other factors, not properties of a material itself, are cross-sectional area and shape, load, and length of span.

"For all practical purposes, the modulus of elasticity is the same for all grades of steel, regardless of alloy content, processing or heat-treatment. This modulus is approximately 1½ to 2 times that of copper and about 3 times that of aluminum.

"Where deflection is the only limiting factor, there is obviously no advantage in using a high-strength steel. Increasing size, changing shape, or shortening the span are the only ways of increasing stiffness of a steel part. Where the limiting factor is not deflection but resistance to permanent deformation, however, the story is different. In the test described, deflection was the same for three steels up to more than 400 lb. of load. But soft steel took a permanent set at approximately 500 lb., while high-carbon steel withstood about 1,600 lb. without permanent set and alloy spring steel withstood 2,200 lb.

"While high-strength steels have no advantage in stiffness, they do provide other benefits, such as greater resistance to permanent deformation (because of their higher elastic limit), higher fatigue strength, greater impact strength, etc."

Thoughtful consideration of the facts just stated indicates that a certain amount of resilience and limited deflection under load undoubtedly should be built into railway passenger cars, for example, in the interests of maximum passenger safety and economical construction. The new A. A. R. specifications call for a design which will resist a certain minimum static end load without permanent deformation and say: "In meeting this requirement, it is important that vertical deflection be kept to a minimum." Many capable engineers of car design feel that this statement, especially if considered without the qualifying footnote, is unfortunate. If it is a fact that vertical deflection should be kept to a minimum, the reasonable inference is that no deflection at all would be a desirable goal. This would mean heavy, cumbersome and uneconomic "battleship" construction, requiring so much metal that there would be little room for pay load and, from the point of view of safety, the hazard to passengers in case of a collision or derailment would be actually increased.

Annual Meeting of the Mechanical Division

Not since 1905, when the Master Car Builders' Association and the American Railway Master Mechanics' Association held their conventions at Manhattan Beach, N. Y., has an annual meeting of mechanical-department officers of the steam railways been held at New York, until this year. On June 28, 29, and 30, the Mechanical Division will hold its seventeenth annual meeting at the Hotel Commodore, the full program of which appears elsewhere in this issue. This is the first time since the beginning of the depression that a three-day annual meeting has been held without the exhibit of the Railway Supply Manufacturers' Association. Two-day meetings were held at Chicago in 1931, 1932, 1935 and 1936. No meetings were held in 1933, 1934 and 1938. During these years the work of the association was kept under way by the action of the General Committee of the Mechanical Division in passing on the reports of important standing committees and submitting the recommendations of these committees for the action of the member roads by letter ballot.

That the Mechanical Division is this year holding a three-session meeting with one session on each of three days is indicative of the value which the General Committee places on the New York World's Fair as a substitute for a strictly technical exhibit of cars, locomotives, car and locomotive devices and materials, and shop equipment.

Locomotive Horsepower And Train Weight

It is not often that a clear-cut opportunity presents itself for the comparison of railway motive power and rolling stock of two countries with as wide variance in methods of design as are found in England and America. An interesting opportunity of this kind is presented, however, by the A. A. R. tests of a 1,005-ton passenger train which were run last fall and the test runs with a 676-ton train of passenger coaches on the London, Midland & Scottish during February of the present year. The tests, themselves, are not of a comparable character, since those conducted by the A. A. R. were for the specific purpose of determining the horsepower capacity required in a locomotive to handle a 1,000-ton passenger train at 100 m. p. h. on level tangent track, while those of the L. M. S. were to check the performance of a specific class of locomotives with a train considerably heavier than the normal weight of the service the locomotive is designed to handle. The interest lies in the comparison of train weights and horsepower capacity in the two cases, and the comparison of passenger accommodations which were available in the two trains.

It will be recalled that the A. A. R. test train consisted of 14 Pennsylvania P70 class coaches, a baggage car, and a dynamometer car. This train had a weight of 1,005 tons behind the tender and measured 1,226 ft. 11 3/16 in. long behind the tender. As to passenger accommodations, the P70 coaches are in service with several arrangements of facilities. The greatest seating capacity of any arrangement of these cars, however, is 88. Using that as a basis for comparison, the A. A. R. train provided seats for 1,232 passengers in addition to a 63-ft. baggage car.

The British trains consisted of 19 passenger coaches, some of the corridor and some of the aisle type, and a

dynamometer car. The coaches, most of which were 60 ft. 8 in., varied somewhat, the longest ones being 63 ft. 8 in., both coupled lengths. This train weighed 676 tons behind the tender, was 1,212 ft. 11¼ in. in length behind the tender, and contained seats for 1,026 persons. Two combination brake vans provided the approximate equivalent of two-thirds of a car length for luggage space.

Three classes of locomotives were employed in the A. A. R. tests—a Pennsylvania K4s type, a Chicago & North Western E-4 4-6-4 type, and a Union Pacific FEF1 4-8-4 type. The latter, which has the greatest horsepower capacity and develops a tractive force of 63,500 lb., presents the most pertinent comparison with the Duchess type locomotive employed in the L. M. S. tests. This locomotive is of the same dimensions and proportions as the Coronation Scot locomotive now on exhibit at the New York World's Fair. It differs principally in that it is one of a group of these locomotives which were built without streamlining and, as a result, has a total engine weight approximately 6,500 lb. less than that of the Coronation Scot streamline locomotive. It has a tractive force rating of 40,000 lb.

The Union Pacific locomotive has developed a maximum indicated horsepower of about 4,900 and weighs 415.75 tons. The combined weight of train and locomotive is 1,420.75 tons, and there is about 3.5 indicated horsepower per ton of combined train and locomotive weight. The Duchess class locomotive on the test runs developed a maximum drawbar horsepower of about 2,500 and a maximum indicated horsepower (calculated) of about 3,350. This locomotive weighs 181 tons and the combined weight of locomotive and train is 857.5 tons. This is an indicated horsepower of 3.9 per ton of combined train and engine weight.

On a fairly comparable basis the American coaches provide seats for 11 per cent more passengers than are accommodated in the British train. The weight of the American train behind the tender is 49 per cent greater than the British train, and the locomotive is 130 per cent heavier than the British locomotive.

The L. M. S. test train, however, was much heavier than the limit of 470.5 tons which now obtains on the Royal Scot service, which is handled by the locomotive tested. With a train of this weight behind the tender the combined engine and train weight is 651.5 tons and there is an indicated horsepower capacity of 5.15 per ton of combined train and locomotive weight. With a locomotive of the capacity of the Union Pacific 4-8-4 type 5 hp. per ton of combined train and engine weight would limit the weight of the train behind the tender to 584 tons and to no more than seven coaches, of the capacity and weight of those employed in the A. A. R. tests, in addition to the dynamometer car and the baggage car.

To provide a ratio of 5 hp. per ton with the 1,000-ton train would require a locomotive capable of developing about 8,000 cylinder horsepower which would weigh about 660 tons, if proportionately the same weight as the Union Pacific locomotive. It is evident that the economically practicable basis for the solution of high speeds in America is reduced train weight as well as increased horsepower capacity.

New Books

TOOL MAKING. *By Charles Bradford Cole, M. E., Published by the American Technical Society, Drexel avenue at Fifty-Ninth street, Chicago. 413 pages, 475 illustrations. 5½ in. by 8 in. Price, $3.50.*

This "how-to-do-it" book leads the apprentice toolmaker from the simple facts about his personal tools and the equipment which the shop provides, to the processes of the toolmaker's craft. This is done through the actual presentation of typical jobs, these jobs being presented as finished working drawings from which the tools they represent may be made. American and National Standard screw threads for bolts, nuts, machine screws, and threaded parts are given in the appendix.

PROTECTIVE COATINGS FOR METALS. *American Chemical Society Monograph Series No. 79. By R. M. Burns, Ph.D., assistant chemical director, Bell Telephone Laboratories, and A. E. Schuh, Ph.D., director of research, United States Pipe and Foundry Company. Published by the Reinhold Publishing Corporation, 330 West Forty-Second street, New York. 385 pages, 5½ in. by 9 in. Price, $6.50.*

About three years ago, upon invitation and with the consent of H. S. Rawdon, author of "Protective Metallic Coatings" which was published in 1927, Messrs. Burns and Schuh undertook to revise Mr. Rawdon's book. During the process, however, it was found expedient to enlarge the scope of the book to include protective coatings of all types, including paint, that those interested in corrosion prevention might be given more comprehensive information on the subject. Hence, the present volume is designed primarily for those who have problems of protection, although considerable information is given on the production of protective coatings so that the reader may have a better understanding of the nature of the various coatings. The sixteen chapters cover Protective Coatings and the Mechanism of Corrosion; Surface Preparation for the Application of Coatings; Types of Metallic Coatings and Methods of Application; Zinc Coating by Hot-Dipping Process; Zinc Coating by Electroplating and Cementation; Protective Value of Zinc Coatings; Cadmium Coatings and Their Protective Value; Tin Coatings; Nickel and Chromium Coatings; Coatings of Copper, Lead, Aluminum and Miscellaneous Metals; Coatings of Noble and Rare Metals; Methods of Testing Metallic Coatings; Composition of Paints and Mechanism of Film Formation; The Durability and Evaluation of Paints; Paint Practices, and Miscellaneous Coatings.

IN THE BACK SHOP AND ENGINEHOUSE

Carbides in a Railroad Shop

*By C. G. Williams**

The writer walked into a railroad shop of one of the largest railroad systems in the country to talk carbides. He was sent to see the assistant shop superintendent who, after listening to our remarks, said "That steel is no good—I have tried it all and it won't stand up, I tell you." At the continued statement that he had never seen that type or grade of carbide-tipped tool, and the suggestion that it be given a trial which would increase production enough to offset any interruptions in shop work, he grumblingly said: "All right, if you want to try it, come on."

He walked down the shop until he came to a 36-in. lathe that was nearly new, on which they were reconditioning piston rods. The lathe was equipped with a special tool holder and a ball-bearing tailstock center, so it was known that there would be a minimum of vibration, for nothing will start up vibration quite as quickly as the old conventional tool post. The machine was powered with a 25-hp. motor, thus assuring no difficulty from lack of speed or power, as the cut at no time would be in excess of $\frac{3}{32}$ in. deep. The mechanic operating the lathe was ordered to give every co-operation, so no time was lost in giving him a tool to start the work.

When asked the price of the tool, which had a shank 1 in. by 2 in. by 8 in. and a tip $\frac{5}{16}$ in. by $\frac{1}{2}$ in., the assistant superintendent was told that in the milled and brazed condition the cost would be $20.26 for a single tool but that in large quantities the price would be lower, at which he yelled "$20.26 for that tool! what do you think we are made of, money?" The reply was, "Keep your shirt on and don't yelp until you are hurt. Just wait until you see what can be done."

The machine was being operated at 58 surface ft. per min., with a depth of cut from $\frac{1}{32}$ in. to $\frac{3}{32}$ in. and a feed of .024 in. per revolution. When the operator had clamped the tool in the rest, he was requested to set the speed at 214 r.p.m. or 294 s.f.m., at which every one drew a deep breath and the mechanic let his out with a long drawn out "What!" "Just 214 r.p.m." was the reply, and that was what we got, with a depth of cut and feed as used before.

When the first piston was completed and a new one put into the lathe, the operator was asked to set the speed at 296 r.p.m. or 406 s.f.m. By this time we had an audience which apparently expected to see some one get killed, but nothing happened. The depth of cut and feed were held as before.

As there was no accident while turning this piston rod, another one was set up and again the speed was stepped up, this time to 398 r.p.m., which for that piston gave 673 s.f.m. Feed and depth of cut were the same as formerly. Will some one please figure the savings made on this last piston on a surface cut 52 in. in length?

This railroad has several Diesel road locomotives and also Diesel powered switching locomotives. In reconditioning them, the shop men try to follow recommendations laid down by Canadian railroad officers, such as building up the worn journals on the crank shaft by chromium plating†, also in "stepping" the sizes of pistons and cylinders.

In the case of chromium-plated crank shafts, it was found that this process entailed more work than formerly, as the bearing must be reground or remain off center to a greater degree than as worn, also there must be added to the cost of reconditioning, the cost of plating, which in itself was no small item.

At this stage of the game, this carbide demonstrator walked into the shop to be greeted with profanity. Somewhat later a suggestion was made "Why not build up the pistons with aluminum allow spray and the crank-shaft bearings with sprayed 1.25 carbon-steel wire." "It has been tried elsewhere and is no good. It can't be machined, and grinding takes too long," was the reply. Oh yes, it has been tried and successfully machined with carbide-tipped tools at 185 s.f.m., roughing cut .080 in. deep and .018 in. per revolution feed. For finishing, the same speed (the limit of the belt-driven lathe), .002 in. depth of cut and .018 in. per revolution feed are used, no grinding being required and making a very fine lasting and hard-surfaced bearing, with a Brinell hardness of 550.

"But we will need to purchase a spray gun, a gas furnace for brazing on the carbide tips, a grinder and a lot of special grinding wheels," comes the objection. What of it? This equipment will prove a good-paying investment, badly needed to bring railroad maintenance practice up-to-date, as compared with that of increasingly active competitors in the field of modern transportation.

* Consulting Engineer.

Heating Work In the Boiler Shop‡

As a readily portable source of intense heat, which is easily controlled and easily localized, the heavy-duty heating blowpipe is admirably adapted for the forming and fitting of locomotive boiler plates. In one locomotive boiler shop, where the oxyacetylene flame has replaced former heating methods, completion of several operations, which previously required hours of labor, is now simply a matter of minutes.

The straightening of pressed flanges on firebox back heads is one of these operations. These back heads are first shaped on a heavy press to provide a flange for the riveted lap joints between the back head and wrapper sheets. This flanging operation leaves an irregular edge which is heated by means of the blowpipe without danger of warpage and then straightened with a hammer and flattener. The flanged fire door opening in the center of the sheet is also included in this preliminary straightening operation.

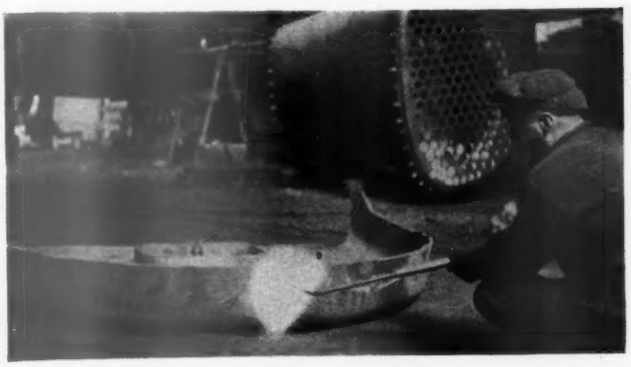
The back head is then placed on a steel straightening block for finishing. Additional local heating and flattening with a sledge hammer and a flattener produce a

† See *Railway Mechanical Engineer*, November 1937, Methods Used on the Canadian National for Maintenance of Diesel Engines, page 509.

‡ Reprinted from the May, 1939, Oxy-Acetylene Tips.

long, thin taper on the flange. This assures a straight and smooth edge where the back head is to be joined to the rest of the outside firebox sheets. Side sheets are similarly tapered.

By means of the blowpipe, heat is applied to the joints of the boiler and firebox sheets which are fitted and



Heating the flange of a locomotive firebox back head during preliminary straightening

bolted together prior to riveting. When the plates are properly heated, they are hammered into close contact and the bolts are drawn tight until a snug fit is assured. Minor straightening is accomplished with a dolly and a hammer.

The use of the blowpipe makes it possible to apply heat, during the fitting operation, to either the throat sheet, the back head or the wrapper sheet without heat-

Flanged nipples formed with a tapered punch and hammer after heating

ing the rest of the assembly. Because the highly concentrated heat of the oxyacetylene flame is thus confined to a small area and applied only where it is needed, possible plate distortion requires little consideration.

The oxyacetylene flame is also used in forming flanged nipples in the boiler plate. The three nipples illustrated are located in the throat sheet between the boiler and the firebox. Each was formed by heating the metal around the hole with the blowpipe flame and driving the hot metal to the outside of the sheet with a tapered punch and hammer.

The production of such consistently well-formed nipples has been possible only since the oxyacetylene was introduced as a heat source for this operation. In using previous forms of heating, it was almost impossible to localize the heat sufficiently to assure equally good results.

During the performance of work of this type inside the boiler or in other confined spaces, there should be adequate forced ventilation, or the operator should be equipped with a mask that is supplied with air from an outside source.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Methods of Determining Satisfactory Welds

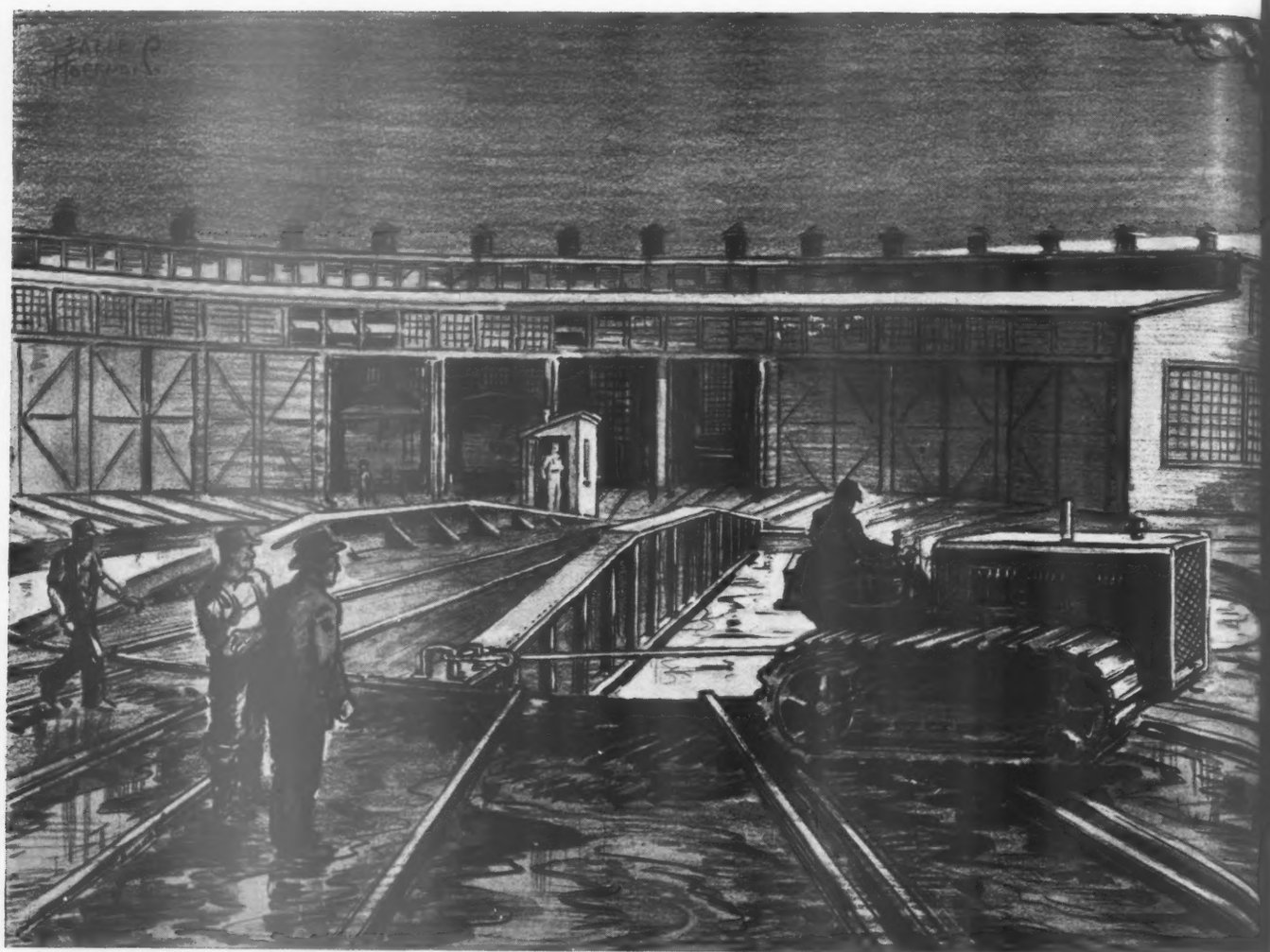
Q.—What methods can be employed to determine whether or not a weld is satisfactory, assuming the test specimens meet all requirements?—F. R. D.

A.—There are four recognized methods of inspecting the quality of welds.

Inspection with Stethoscope—The stethoscope is used mostly as an inspection preliminary to making X-ray examinations of doubtful regions. By listening with the stethoscope while tapping gently along a welded seam with a light hammer, an experienced person is able to detect the difference in sound when the hammer strikes the weld in the immediate vicinity of a fault. Its effective use requires a high order of perception of sound quality, together with considerable skill and training.

Electro-Magnetic Method of Inspection—The magnetic reluctance of a weld of ferro-magnetic material is increased by any fault occurring in it. Hence, when a magnetic flux is passed through the weld and adjacent base metal, with the lines of a flux approximately at right angles to the weld, there will be more flux leakage directly over the faults than at good portions of the weld. The faults can be detected either by sifting iron filings or iron powder on a piece of paper placed on the weld and observing the picture formed, or by exploring with an instrument capable of reading the strength of the leakage flux. This method is quite sensitive to cracks or poor fusion at or only a short distance under the surface of the weld, particularly if the weld be smooth and flat and in a flat position. The sensitivity is considerably impaired by the rough surface of the weld, by sloping or vertical surfaces, or by the fault being buried far beneath the surface.

(*Continued on page 239*)



Wolf! Wolf!

THE boy in the second reader cried "wolf" once too often and lost his sheep. H. R. Long, general foreman for the S. P. & W. at Plainville, did the same thing and came very near tying up the whole railroad.

When the company physician told John L. Starkey that he could take ninety days off and perhaps live to enjoy a pension, or stay on the job and let his widow collect his insurance, Starkey decided in favor of prospects of a pension.

When H. H. Carter, the master mechanic, suggested to Jim Evans, the roundhouse foreman, that he take over in Starkey's place, Evans vetoed the idea. "My job will drive a person nuts," Evans said, "and that one will worry you to death. I prefer to be a living lunatic." Evans laughed to show that he was joking, but he didn't take the job.

One of the backshops where Long was foreman was temporarily closed down. He was sent to Plainville to fill the vacancy while Starkey was recuperating.

"I've heard this is a pretty hot job," Long told Evans, "but I don't see why it should be."

"Oh, it's not so bad," Evans said. "The worst trouble is the roundhouse is too small and we are way out here on the tail end of the railroad where it takes quite a while to get material."

"Well, I'll leave it with you for the rest of the afternoon," Long said. "See you in the morning."

The new general foreman was on the job bright and early next morning. He and Evans both arrived at about the same time. Evans went into the back office to change clothes. Long stopped to look at the dope book and some work reports that were laying on the desk in the front office.

"The engineer reported the driving-boxes pounding bad on the 5082," Long said. "Maybe we had better run her over the drop-pit and drop the drivers."

"Good idea," Evans agreed, "if you've got enough engines without her."

"The 5071 is reported not steaming," Long read from another report.

"And," Evans added, "the engine rides hard. Stewart came in on her, didn't he?"

"Yes; how did you know?"

"That's easy—no engine ever steams good for Stewart

The tractor, fortunately for the foreman's blood pressure, was available. An hour later it was slithering over wet rails and slippery mud around the turntable pit pulling the table

by
Walt Wyre
• • •

and they all ride hard." Evans pulled on a jumper and reached for his battered old derby. "I'm going to the roundhouse and get the work reports lined up."

"O. K.," Long said. "I'll be with you shortly."

THE new general foreman didn't say much the first day, but it was very evident he wanted to. Several times he acted nervous as a country cat in town. One time when an engine was called for 11:30 and was still in the house at 10:45, he chewed off all the finger-nails on his left hand and was just starting on his right when the hostler came after the engine at 10:55.

Next morning Long decided to speed things up a little. He started in at the drop-pit.

The 5085 was scheduled to be out in a couple of days and unless something unusual happened, it would be. Machinist Cox was grooving the crown brasses and the drivers would be ready that day.

"How soon will you be ready to start putting the drivers up?" Long asked the machinist.

"Oh, sometime tomorrow," Cox replied.

"We've got to get her sooner than that," the general foreman said. I'm figuring on running her tomorrow night. Rush the work up," he added.

Cox, willing to accommodate, pitched in. By extra effort and letting a few little things go, he was ready to start up with the drivers before five o'clock that day.

Next morning about ten o'clock, Long told the fire-builder to get the 5085 hot. He marked the engine up on the board to run that night.

"What are you trying to do?" Cox's helper complained. "Use up all the work there is in one day?"

"The general foreman said he had to have the engine today," Cox replied, "and it's up to us to get it."

At 4:30 the 5085 was finished. The hostler ran it off the drop-pit and into another stall. Next morning the engine was still standing there and it stood all day.

"Guess old hurry-and-rush didn't need the 5085 bad as he made out," Cox's helper commented.

"Guess you're right," the machinist agreed. "But maybe something happened and he didn't have to have the engine."

The nickname "Hurry-and-Rush" stuck and the general foreman lived up to it. Every job was an emergency and every engine was needed immediately if not sooner.

The 5088 valves were reported blowing. Machinist Martin and his helper were given the job of pulling the valves.

They had just started when the general foreman came by. "Get it soon as you can," Long told the machinist. "I've got to run her west at 1:30. I want to look at the bull rings when you get them out," he added.

"O. K.," Martin said. "We'll have them out in a little while."

When the general foreman inspected the valves, it was found that new packing rings would suffice for the present. New bushings and bull rings would be needed sometime soon, however.

"All right," Long said, "I'll give you a requisition for rings. Get them in soon as you can." The general foreman gave him the requisition and went to the storeroom.

"How many valve bushings and bull rings for 5000s have you got on hand?" Long asked the storekeeper.

"Two of each," the storekeeper replied.

"That's not enough;" the foreman shook his head, "order two sets of each—better wire for them and have them shipped passenger."

The 5088 didn't run until sometime that night. Machinist Martin was sore as boil ready to burst because he had worked at top speed to get the engine finished and then it didn't run.

BY the time the general foreman had been on the job two weeks, nobody paid any attention to his urging. If it made any difference, there was a tendency for the work to slow down.

In the meantime, Evans was having trouble of his own and the general foreman interfering in the roundhouse didn't help any. Once or twice Evans had tried to talk to the general foreman about how conditions were getting, but Long didn't seem to realize what the trouble was

and changed the subject. The general foreman blamed the men; said they were laying down on him.

"The men are all right," Evans told him. "They are about as good as you'll find any place."

"But it doesn't seem like they are getting the work out like they should," Long said. "I don't like the idea of waiting until the last minute to get an engine ready."

"Neither do I," Evans said, "but we can't help it. That's a running repair job for you. I'd like to have at least one extra engine ready to go at all times, but it can't be done."

"Why can't it?" Long asked.

"Well, in the first place," Evans told him, "if we had an extra engine, the officials would make us store it. In the second place, we're not going to get it. We're getting along fairly well—only had one engine failure since you came."

"Maybe so," Long admitted, "but I've nearly had heart failure a dozen times a day."

"That's part of the job too," Evans told him, "if you let it affect you that way. Have you noticed the tires on the 5083?"

"No, I'll go look at them." The general foreman walked out to the inspection pit where the 5083 was standing. The tires were getting in bad shape. The one on the right main driver in particular had a sharp flange and all were tread worn. The tires were too thin to stand another turning, too.

Long hurried out where the tires were stacked to see if there were some that could be used. There weren't.

He rushed to the storeroom. "Say, how about a set of tires for the 5083?" he asked the storekeeper. "I need them right away."

"Will this afternoon be soon enough?"

"Rush them up," Long said. "The ones on her are not in condition to make a trip.

"O. K.," the storekeeper agreed without enthusiasm. "And say, what about those bull rings and valve bushings I had shipped passenger? They're still here."

"We'll need them," Long said. "In fact, they're needed right now if I could get time to use them."

The storekeeper made a memorandum to order the set of tires and promptly forgot about it, for the time being, at least. Two days later he sent the requisition off, but without notation to rush them.

LONG had been in Plainville four weeks when things seemed suddenly to go all to hell. It started Monday morning with a rain that would have started Noah to loading animals. Heavy rains are not usual in Plainville. As a result no one is ever prepared when one comes.

The roundhouse roof leaked worse than army pup tents during the World War. By eight o'clock the roundhouse office looked like a houseboat standing in a lake. Between each pair of rails going to the turntable a small river flowed, the water cascading into the turntable pit. No one noticed that the drain was stopped until the water was over the circular rail and rapidly rising. By the time the water service men were located, the water had risen six inches more.

The big gears on the turntable tractors were dipping water when Ned Sparks, the electrician, noticed them. He watched while the table was being turned. At high speed the gear teeth carried the water up and sprayed a large portion on the motors.

"Say," Sparks yelled to the hostler helper who was operating the table, "slow down! You're going to drown them motors!"

The hostler helper, if he heard, didn't heed. The table continued to turn as fast as the motors would turn it. The electrician rushed over to the cab. By the time he got there, the hostler helper was lining the table.

"If you run the table full speed, water splashes over the motors," Ned told the hostler helper. "Run it slow as you can or you'll burn the motor out."

"O. K.," the helper agreed as he waved a watery signal to the hostler.

The water service men waded in waist deep and probed at the drain in the turntable pit trying to open it up. Results, if any, were only to wedge tighter whatever obstruction clogged the drain, and the water continued to rise.

At 9:30 the turntable gears were half submerged and running the table slow didn't prevent water being thrown on the motors. The rain had eased up a little, though, and light streaks in the clouds indicated that it would quit altogether soon.

The electrician told the hostler that running the turntable might cause the motors to be ruined.

All engines that were to run soon were out of the house, but three were standing ready to go in. The hostler was waiting for the water to subside somewhat in the turntable pit before putting the engines in the house when the general foreman came out.

"Why don't you get them engines in the house?" Long asked the hostler.

"The electrician said it might ruin the motors . . . "

"We've got to get them engines in the house," the foreman interrupted. "Have your helper line up the table."

"O. K." The hostler went in search of his helper.

The electrician, hearing the turntable running, rushed out to see what was going on.

The hostler helper mindful of what Sparks had told him was running the motors at slow speed. The general foreman was imitating a chicken crossing a road covered with hot asphalt. He stood it long as he could. "Is that as fast as it will run?" Long yelled.

"No, but the electrician—"

"Blast the electrician! Hurry up and get them engines in the house. Let me have it!"

The foreman fairly grabbed the controller handle. Br-r-r--r!-- the roller sang over the notches as he shoved the handle all the way round.

The traction wheels spun on the wet rail. The gears became whirling fountains and the motors became wet.

Some motors will run submerged in water, but they are designed for that purpose. The ones on the turntable at Plainville are not that type. The motor on the cab end went out first. The electrician was standing by the side of the pit waiting for it to go when it happened. There was a flash of fire under the cab. An instant later the overload relay kicked out. Long stopped the turntable.

"What happened?" he asked.

"Motor grounded," Sparks told him. "It got wet."

"One motor will turn the table, won't it?"

"Yes, but I'm afraid it's wet too."

"We've got to get these engines in the house." The foreman shoved the controller handle around.

The one motor groaned a protest and started, pulling the table alone. He got the first engine in the house, but the other motor quit before the table was spotted for the second.

"How soon can you get it going again?" Long asked the electrician.

"I've got one extra motor," Sparks said. "We might be able to get it going tonight or maybe with good luck late this evening."

"We've got to get the engines out," Long said earnestly. "How we going to do it?"

"The maintenance of way has a big caterpillar we used one time," Sparks told him. "I don't know whether it's in town or not. The division engineer would know."

The tractor, fortunately for the foreman's blood pressure, was available. An hour later it was slithering over wet rails and slippery mud around the turntable pit pulling the table. It was a slow process, but the tractor made it.

By one o'clock the rain had stopped and the sun was shining brightly, but trouble didn't leave with the clouds.

Two delays getting engines out could be charged to the turntable, but a broken main pin couldn't. The 5077 was nine miles out when it happened. The engineer was on short time to beat the Limited into Plainville when the pin let go. Sixty miles an hour may not be so fast nowadays, but the back end of a main rod turned loose at that speed will do a lot of damage.

The 5068 was sent out to bring the train and crippled engine in.

About two o'clock that afternoon the dispatcher called and said he wanted an engine about midnight for an extra east. "It's a Chamber of Commerce Special," the dispatcher said, "and mighty important. The general manager is on the train," he added.

"What are we going to use?" Long asked Evans.

"The 5083 should come in on 71 about four o'clock," Evans said. We might use her.

About two-thirty a message was received from the foreman at Sanford, the next division point east: "The federal inspector examined tires on engine 5083 date. Suggest they be renewed before engine is dispatched again."

Long read the message and headed for the storeroom like a belated whirlwind. "How about the tires for the 5083? Have you got them yet," he asked excitedly.

"Next week," the storekeeper replied placidly. "You haven't used all them bull rings yet."

"But I've got to have them." The general foreman laid the message on the storekeeper's desk.

"Let's see;"—the storekeeper picked up a stack of bills—"they should be in about day after tomorrow."

Long sputtered and fizzed like soda in lemon juice, but that didn't get the tires. "I told you I was in a rush for those tires," he said.

"Yes, and you told me you were in a rush for those bull rings and valve bushings, and everything else I've ordered in the past six weeks," the storekeeper reminded him.

That was that and nothing to do about it. The general foreman left the storeroom and went back to the roundhouse office. "Now what are we going to do?" he asked Evans.

"I'll guess with you," Evans said soberly. "It looks pretty bad. We might get enough men on the 5084 and get her off the drop-pit."

"It's a slim chance," Long said, "but our only one."

Chances of getting the 5084 finished were slimmer than the foreman had feared. Cox hadn't even started putting the wheels up.

"We've got to get this engine finished and out by ten o'clock tonight," the general foreman told the machinist. "I'll give you some help on it," he added.

"O. K.," Cox agreed, "we'll do our best."

"Another rush job on an engine to stand around two or three days after it's finished!" Cox's helper said when the foreman had left.

"Don't worry," Cox said. "I've quit rushing."

Two other machinists and their helpers were sent down to the drop-pit to help on the 5084. The general foreman told them as he had told Cox that the engine had to be out by ten o'clock. They didn't believe it either.

At five o'clock it was very evident that the 5084 would not be finished. All of the men were working but without hurrying. If any difference, they were working more slowly than usual.

Long raved and stormed, but it had no effect on the men except possibly to cause them to slow up a little more.

"What can we do?" Long asked Evans for perhaps the hundredth time.

Evans scratched his head thoughtfully. "Will you do what I say if I make a suggestion?"

"I'll do anything if there's any chance of getting the 5084 finished."

"All right! Don't come around the drop-pit until 10:00 tonight. Yes—you might come around about 7:30 with a lot of sandwiches and a pot of coffee; and don't say a word to any one when you do."

"I don't understand," Long said.

"Well, I'll tell you." Evans bit off a hunk of "horseshoe". "You've hollered wolf so often the men don't believe you when one really shows up. I don't know whether we can get the 5084 finished or not, but we'll try."

"I hope it works," Long said.

Evans went to the drop-pit right after the five o'clock whistle blew. The machinists were standing around not knowing exactly whether to work or not.

"Fellows," Evans began, "we're in a hole. We've got to have this engine out tonight. And when we finish it's got to run. Can we do it?"

No one answered.

"If we can, pitch in;" Evans went on, "if we can't there's no use working overtime on it." He turned and walked away satisfied by the look on the men's faces that every effort would be made.

Evans was right. At 10:15 the 5084 rolled across the turntable. If the consumption of valve oil jumped that month, it was because every bearing on the 5084 was dripping with it; but she ran. And the general foreman learned it's a good idea not to shout "wolf" until the animal appears.

Locomotive Boiler Questions and Answers

(*Contnued from page 235*)

Inspection by X-Ray—Weld metals can be X-rayed and their internal defects clearly visible on photographic plates. If there are cracks, holes or general porosity within a weld, the X-ray photograph will reveal the condition. The method is simple. It consists of placing an X-Ray tube on one side of the weld and the photographic plate on the other. After proper exposure, depending upon the thickness of the material and the strength of X-Ray, the plate is developed and examined for defects in the weld. This method is widely used as final inspection of pressure vessels which come under Class I of the A. S. M. E. Boiler Code.

The Gamma Ray Method—Newer than but similar to X-Ray inspection is inspection by Gamma Rays. The Gamma Ray emanates from radium. This ray penetrates the weld more quickly than the X-Ray and is therefore used either for inspecting heavy work, which would require impracticably long X-Ray exposures, or for speeding up inspection on ordinary material.

Welding the Ends of Longitudinal Butt Straps

Q.—On page 157 of the April, 1938, issue of the *Railway Mechanical Engineer* you answered a question on the welding of the outside welt strap. In this particular joint there are five rows of rivets. Would the same welding be applied to a joint in which there are only three rows of rivets? Our instructions are that any welding on the boiler barrel be protected by riveting. Do you consider this to be necessary, and if so, would the inside welt strap on the joint shown in the April issue be taken as protecting the weld?—E. L. B.

A.—The seal welding of the shell and the outside butt strap for tightness would apply to a triple-riveted seam in the same manner as to a quadruple riveted seam.

In the case of the seam submitted with the question, as illustrated in Fig. 1, it would only be necessary to weld along the shell course for 12 in. as shown, the outside butt strap at this end of the seam being on top of the circumferential seam and can, therefore, be readily caulked; the 12-in. weld along the shell course seals the end of the seam.

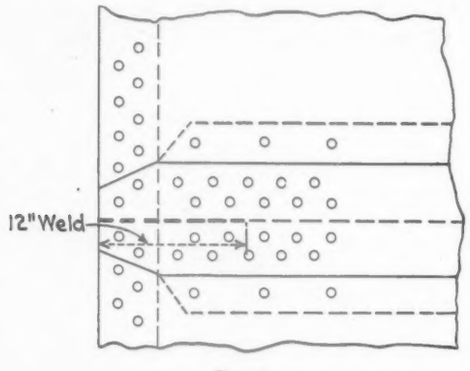


Fig. 1

The illustration shown in the April issue shows the opposite end of the seam where the outside butt strap and the circumferential seam are in the same plane, making it difficult to caulk the edge of the outside butt strap adjacent to the shell course and for this reason, seal welding is used in place of caulking around the end of the outside butt strap in addition to the 12 in. along the shell course.

In all cases where the strength of the structure is dependent upon the strength of the weld, the weld should be reinforced so that the safety of the boiler is not dependent upon the strength of the weld.

The welding of the ends of longitudinal seams as illustrated in Fig. 1 does not in any way affect the strength of the structure in that the strength of the seam or its efficiency is not dependent upon the strength of the weld which is used only to seal the end of the seam.

Layout Work for Apprentices

Q.—Where can a textbook be obtained that deals with the laying out of the parts that make up a locomotive boiler. We have 14 boilermaker apprentices and some of the older boys have taken the usual work in developing surfaces. Since some of them are nearing the completion of apprenticeship, I would like to give them some locomotive boiler layout work, and as a matter of fact, have had "Laying Out for Boilermakers" on hand for some years now. However, the section on the locomotive boiler by W. E. Joynes seems rather advanced for our apprentices and I wonder if there is anything else that you could recommend to us that treats the subject somewhat simpler?—G. A. H.

A.—I would suggest that you contact the apprentice supervisors of other railroads who have apprentice courses. There are several who have very fine courses for boilermaker apprentices.

I do not know of any textbook dealing with the subject of laying out for boilermakers that would answer your purpose.

The general practice is for the apprentice supervisor to originate a selected course, starting with geometric problems, then simple layouts in which the apprentice completes the third view, followed with simple layout problems; illustrating the three methods of development; first, parallel line construction, second, triangulation and third the radial line method of development, following this with problems relating directly to boiler work.

Such a course could be taken from the article "Elementary Plate Layout" starting in the June, 1934, issue of the Boilermaker and followed by Practical Plate Development starting the March, 1935, issue of the same publication.

The Causes of Cinder Cutting

Q.—What is the cause of the cinder cutting of the tubes and flues of a locomotive boiler at the firebox end and how can this trouble be overcome?—J. H.

A.—Cinder cutting of tubes and flues at the firebox end of a locomotive boiler generally takes place at the bottom of the tube and flues directly ahead of the firebox tube sheet, and is due to the high velocity of the forced draft entering the tubes and flues causing the unburned cinder to cut and gradually wear the tubes and flues thin, until the pressure around the tubes breaks through causing a leak.

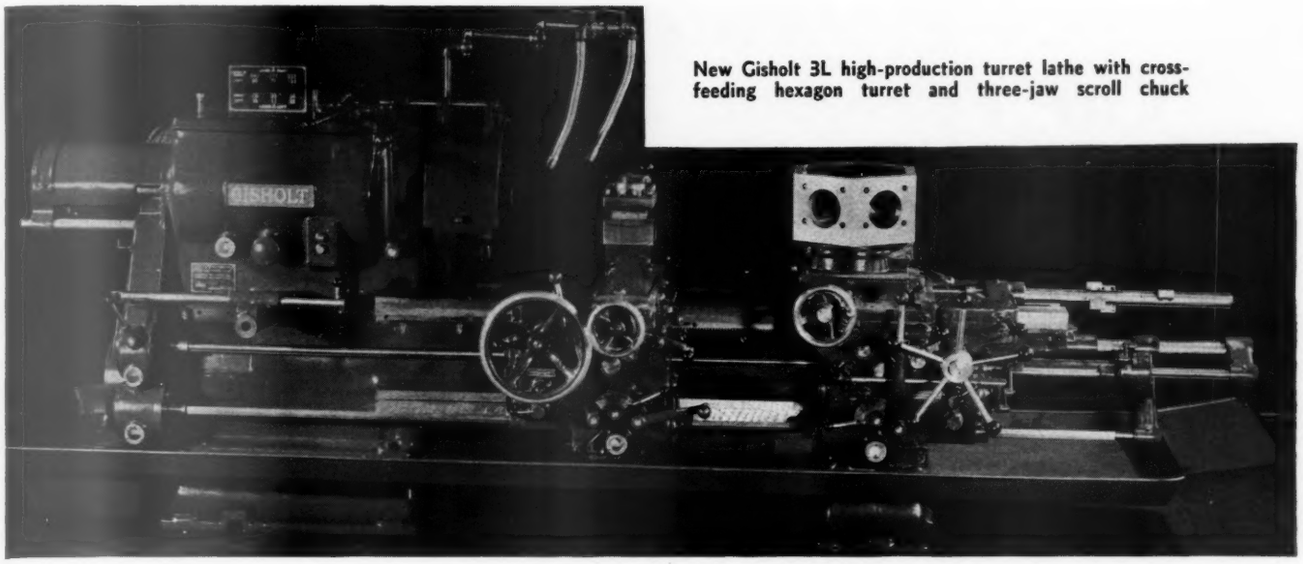
Cinder cutting is often caused by the use of an improper arch and can often be remedied by a change in the arch-brick assembly. On locomotives where this trouble cannot be overcome, it can be reduced to a great extent by applying heavier gage safe ends on new or replacement tubes and flues.

Improved High-Production Turret Lathes

Many new refinements to improve the performance and ease of operation, increase machine life and further extend its field of usefulness have been incorporated in the new Gisholt 1L, 2L and 3L high-production turret lathes, built by Gisholt Machine Company, Madison, Wis. They have bar capacities ranging from 2½ in. diameter to 4½ in. diameter and from 36 in. long to 48 in. long. The lathes have a swing over the ways ranging from 19 in. to 26 in. and employ chucks ranging from 12 in. in diameter to 21 in. in diameter. They are intended for both high production of similar pieces and small lot jobbing of various types of work, and are equally well adapted to both bar work and chucking work.

High-carbon alloy steel ways are a feature which give hardened bearing surfaces on all sides, including the top or main bearings, the sides for alinement and gibbing, and the bottom for clamping.

The strongly braced headstock is cast integral with the bed casting, which makes an exceptionally rigid construction. The headstocks for all three models have 12 different spindle speeds, the normal range of which in the 1L and 2L is from 20 to 486 r. p. m., and for the 3L is from 12 to 333 r. p. m. A direct reading speed plate mounted on the headstock tells the operator at a glance the r. p. m. at which the spindle is running.



New Gisholt 3L high-production turret lathe with cross-feeding hexagon turret and three-jaw scroll chuck

The spindle is mounted on precision-type tapered roller bearing and all shafts in the headstock, as well as the aprons, are mounted on anti-friction bearings. The gears are made of high-carbon chrome-molybdenum steel, hardened, and the tooth contours ground to give perfect rolling bearings and quiet operation. The high-speed gears are helical type. A double-multiple disc clutch is used for starting and reversing the spindle, and a powerful multiple-disc brake automatically stops the spindle when the machine is shifted into neutral. The spindle nose is American standard flanged Type A1.

The feeds and rapid traverse are controlled at each carriage independently of each other. Sixteen reversible power feeds in two ranges of eight each are available for both longitudinal and cross feeds of the cross slide or the cross-feeding hexagon turret. The longitudinal feeds range from .004 to .136 and the cross feeds range from .002 to .068 in. on the 1L machine and .002 to .084 in. on the 2L and 3L machines. The levers for engaging the feeds on the carriages have direct reading feed plates, which tell the operator at a glance the feed he is using in thousandths of an inch. The cross-feed screws on the cross slide and also on the cross-feeding hexagon turret have a large diameter dial graduated in one-thousandths of an inch, which permit the operator to feed to close dimensions and assist him in making quick set-ups.

A safety shear pin in the feed train on each carriage protects the feed gears against overload due to tool failure or accident and a safety friction affords similar protection to the rapid traverses. All apron gears are made from alloy steel and heat treated.

Multiple vee-belt motor drive is standard on all three models and the motor is mounted on the top of the headstock. The drive pulleys are balanced on Gisholt balancing machines, assuring vibrationless operation. Standard motor recommendations for the 1L machine are up to 10 hp. For the 2L and 3L machines, the motor recommendations are up to 15 hp. For high-speed operation, 15 hp. motors are recommended for the 1L and 20 hp. motors for the 2L and 3L machines. The motor is controlled by a conveniently located start and stop switch built into the headstock.

Rapid traverses are supplied for the longitudinal travel of both carriages and also for the in and out travel for the cross slide on the side carriage. The rapid traverse levers are provided with colored knobs for the operator's convenience.

All three machines are equipped with either fixed-center hexagon turret or cross-feeding hexagon turret. The fixed-center hexagon turret is recommended for work occurring in sufficient quantities to employ multiple tooling such as multiple turning heads and piloted boring bars. The cross-feeding turret is particularly efficient on small lot work where the production is too small to absorb the set-up time for multiple tooling. This turret may also be locked on center and used with piloted turning heads and piloted boring bars with the same effectiveness as a fixed-center hexagon turret machine. The cross-feeding hexagon turret employs simple tools such as single point boring bars, single point tool holders, etc. Holes are bored by adjusting the turret off center the desired amount. This not only provides an efficient method for handling small lot work and also varied types of work but it also keeps the tool cost at a minimum.

The available attachments include a built-in taper attachment for the cross slide which is provided with a standard guide plate for cutting tapers up to 1½ in. per ft. and 12 in. maximum length, or special guide plates may be furnished for tapers up to 3 in. per ft. and 6 in. maximum length. Tapers may be cut at any point within the travel of the cross slide. The hexagon turret taper attachment is also available, which is of the heavy-bed type design and permits cutting tapers or taper bores up to 8 in. taper per ft. and 12 in. maximum length.

The new type collet chuck is the push-out type with a four-split master collet and pads. The new design permits collet pads to be easily changed without removing the collet hood or master collet from the spindle. Thread chasing attachments are available for both the side carriage and for the hexagon turret carriage. They are of the leader and follower type and are designed for cutting extremely smooth and accurate threads.

Compound rests with power angular feed are available for all three machines. The compound rest is mounted on the cross slide and has 300 deg. of adjustment and may be set at any angle for machining angular surfaces such as the faces of bevel gears, etc. The compound slide has a graduated micrometer dial with a handle for setting the slide to the desired position. The compound has a dial graduated in degrees which facilitates setting to the proper angle.

These turret lathes are supplied with automatic lubrication to all important bearings.

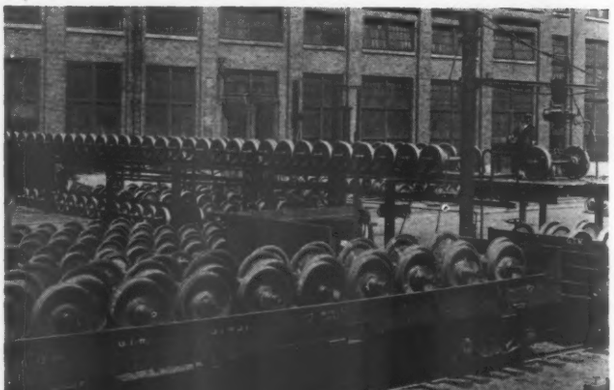
With the Car Foremen and Inspectors

Handling Devices at

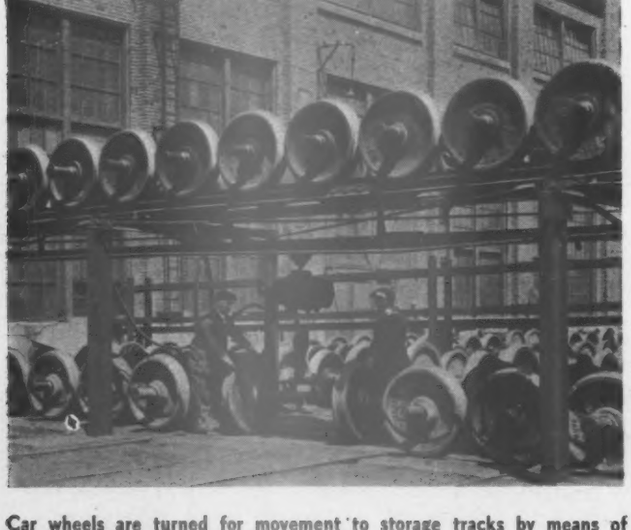
Battle Creek Wheel Shops

THE car-wheel shop of the Grand Trunk Western at Battle Creek, Mich., is notable not only for the compact and efficient arrangement of machinery, but for the many labor-saving devices developed for handling wheels and axles both inside and outside the shop. Machine equipment in this shop includes two axles lathes, one boring mill, two journal lathes, one wheel lathe and one wheel press. Because of the limited amount of floor space, approximately 4,500 sq. ft., much of the wheel handling is done on one main elevated ramp for mounted wheels and two elevated wheel chutes, one for incoming new wheels and the other for outgoing scrap wheels. The entire operation is designed for direct movement of the wheels and axles through the shop, without the interference of backward or cross travel and with automatic air-operated devices replacing manual labor wherever possible.

For example, referring to the first illustration, it will be observed that mounted wheels, loaded in special cars at various points on the Grand Trunk Western, are received at Battle Creek shops and the wheels unloaded on the elevated track or wheel ramp, which extends into the shop within 12 ft. of the wheel press. This track has a slight incline, which causes the wheels to roll by gravity to the end of the track in the shop, where an air-operated elevator cage automatically lowers them to the ground track and they fall on taper wedges, then rolling forward to the wheel press. Necessary repair operations on the wheels and axles are performed, after which they are reassembled and rolled out of the shop on the track underneath the elevated ramp, to be placed on storage tracks or loaded in outgoing wheel cars. This method of operation saves the obvious interference and confusion which can hardly be avoided when an attempt is made to handle both incoming and outgoing wheels on the same track at ground level.



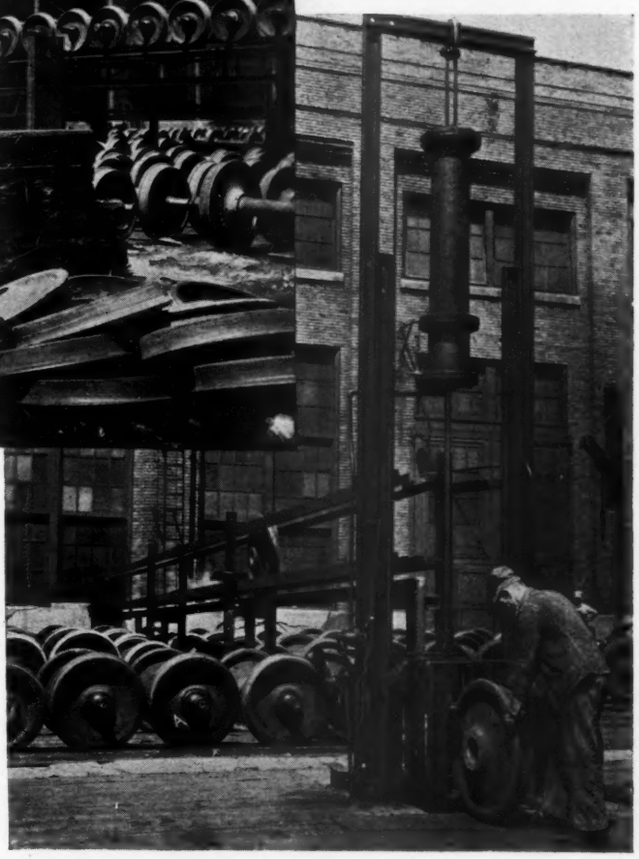
Outside equipment for handling car wheels at the Grand Trunk Western Shops, Battle Creek, Mich.



Car wheels are turned for movement to storage tracks by means of an Ingersoll-Rand two-ton air hoist and mono-rail suspended under the main wheel ramp

In the view of the elevated wheel ramp is shown the mono-rail and Ingersoll-Rand two-ton air hoist used in turning mounted car wheels for movement to storage tracks. The third illustration is a composite view showing the ingenious and effective elevated wheel chutes used in handling individual car wheels. New wheels, received in special cars from the manufacturer, are unloaded with a magnet crane and placed on the platform immediately adjacent to the wheel chute shown at the right. New wheels are simply rolled, one at a time into the air-operated elevator cage, which raises them to the level of the wheel chute down which they roll into the shop and within a few feet of the boring mill. Similarly, scrap car wheels, removed from axles at the press inside the shop, are raised by an air-operated elevator cage to the upper end of an elevated wheel-delivery chute, the outer end of which is shown at the left in the third illustration. A scrap car wheel is shown in the illustration just on the point of dropping from the end of the chute. These car wheels are then loaded on an outgoing scrap car by means of a magnet crane.

It will thus be observed that the use of the main elevated ramp and the two wheel-delivery chutes not



Wheel chutes: Left—For delivering wheels from the shop; Below—For delivering new wheels to the shop

only conserves floor space, both inside and outside the shop, but saves a great amount of manual labor, and hazard involved in rolling mounted and unmounted wheels from one point to another about the shop. By the present method, only a small amount of manual labor is involved in handling individual wheels at each end of the wheel chutes and in rolling finished mounted wheels in one direction out of the shop.

Construction of the Elevated Ramp and Wheel Chutes

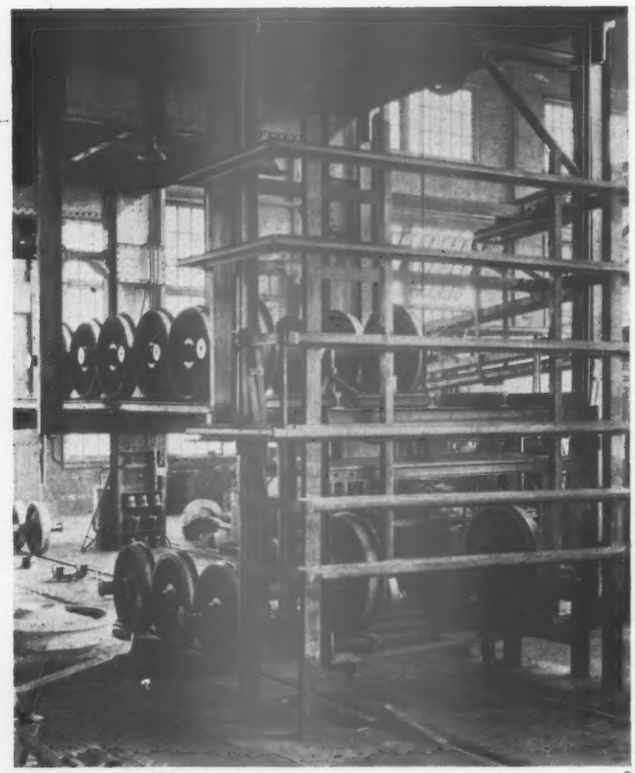
The main elevated wheel ramp is made of 80-lb. steel rails, supported on cross rails which are welded at each end to 10-in. vertical I-beams, set in a concrete base and spaced 9 ft. apart, with 18-ft. spans. One-inch cross-tie rods are provided to stiffen the structure, the outer end of which, adjacent to the wheel cars, is 9 ft. high. The rails are inclined about 1 ft. in 100 ft. so that the wheels move by gravity into the shop. A strongly-constructed jib crane, with 18-ft. boom, 16 ft. high, is equipped with an Ingersoll-Rand two-ton air hoist for handling wheels.

In unloading a car of mounted wheels, received at the shop for reconditioning, a wooden extension platform is installed, so that by means of a short lift and slight swing of the boom, the wheels can be readily placed on the extension platform and started down the wheel ramp. When loading reconditioned mounted wheels, this wooden platform is removed and the wheels easily lifted from the outgoing ground track into the car, using the same jib crane and air hoist. The upper deck of the main wheel ramp is covered with plank between the rails to serve as a safe walkway when it is occasionally necessary for shop men to pass over it. The mono-rail, suspended under the center of the main wheel ramp, is equipped with a second two-ton Ingersoll-Rand hoist which provides easy means for turning a pair of wheels at any point on the outgoing track.

In the fourth illustration, mounted car wheels are stopped at the inner end of the main wheel ramp by a well-braced 3-in. vertical rod, operated by an 8-in. by 12-in. air cylinder and extending just high enough to contact the leading car axle at its center. Just beyond the rail ends is an air-operated elevator cage of welded rail construction which is capable of vertical movement in a rugged steel frame, being quided by suitable rollers bearing against the corner posts and raised and lowered by cable extension from a 10-in. by 84-in. air cylinder. In the upper position, the elevator cage track lines up with that on the wheel ramp so that, when the holding piston rod is withdrawn, one pair of wheels rolls into the cage, where it is centered by a slight depression in the hinged supporting rails. When the cage reaches its lowest position, the wheel-supporting rails are given a slight tilt by contact with the shop floor and the wheels automatically roll onto a pair of taper wedges and thence down the track a short distance to the wheel press. The operation of the air cylinders which move the holding piston rod and also the elevator cage is controlled by air valves located within easy reach of the operator at the wheel press who can get another pair of wheels whenever needed by simply operating these valves and without leaving his place at the press.

The car-wheel press, operated by two men, is equipped with two roller-type wheel carriers and a special block which enables the wheels to be pressed on without turning the axle end-for-end, by first pressing the axle into one wheel and then slipping the block over the journal and pressing the other wheel on the axle.

Referring again to the illustration showing the wheel chute for delivering new wheels to the shop, the construction of this device will be apparent. It consists



Air-operated elevator cage for dropping incoming wheels to the floor preliminary to pressing off

essentially of welded rail construction, the 10-in. by 70-in. air cylinder being suspended from the top of a rectangular rail frame 16 ft. high with the side rails separated 34 in. The elevator cage, is directly connected to the air-cylinder piston rod and is guided in vertical movement by four 3-in. rollers which contact the sides of the framework. The wheel chute runway is of simple construction, the weight of the wheels being carried on a single rail which contacts the treads, with two rails on each side serving as a guide to keep the wheels upright. The inclination of this runway also is 1 ft. in 100 ft. and it extends through the shop wall, delivering wheels to within a few feet of the boring mill.

This wheel chute is entirely automatic in operation. Each wheel, as received at the chute, is simply rolled into the cage and when all the way in, it trips an air valve which admits air to the operating cylinder, thus raising the cage to its upper position in which the wheel rolls by gravity onto the inclined runway and on into the shop. The wheel is stopped at the end of the chute by side friction of the two upper guiding rails which are held a fixed limited distance apart by air pressure from a small 6-in. air cylinder. When it is desired to release a wheel from the chute, this can be done by means of a foot-operated air valve which releases pressure in the holding cylinder and permits one of the wheels to roll out to the shop floor where it can be easily guided to the wheel press or placed in a temporary adjacent storage space.

This brake device provides a positive safety feature but, in addition, two electric signal lights have been installed in such a way that, in delivering new wheels into the shop by means of the wheel chute, when the wheel first enters the outside elevator cage a white light is shown at this point and a red light shows at the delivery end of the chute. When the wheel leaves the chute both lights are out. Shop men thus know by signal-light indication when a car wheel is coming down the chute into the shop.

Scrap-wheel elevator and delivery chute—Axle carriers are seen in the center and foreground

A similar wheel-elevator cage, but with a horizontal-acting air cylinder having a steel cable connection to the cage, is installed in the shop adjacent to the wheel press, where scrap wheels can be easily rolled into the cage, raised to the elevated wheel-delivery chute and rolled by gravity through the shop wall and out to the pile of scrap wheels, as shown in one of the illustrations mentioned. The inclination of the wheel-supporting rail in the scrap-wheel chute has to be slightly greater than that designed for handling new wheels, owing to the somewhat greater resistance to free rolling.

The balanced air lifting device, used in handling wheels at the boring mill, as shown in two of the illustrations, was not originally developed at Battle Creek

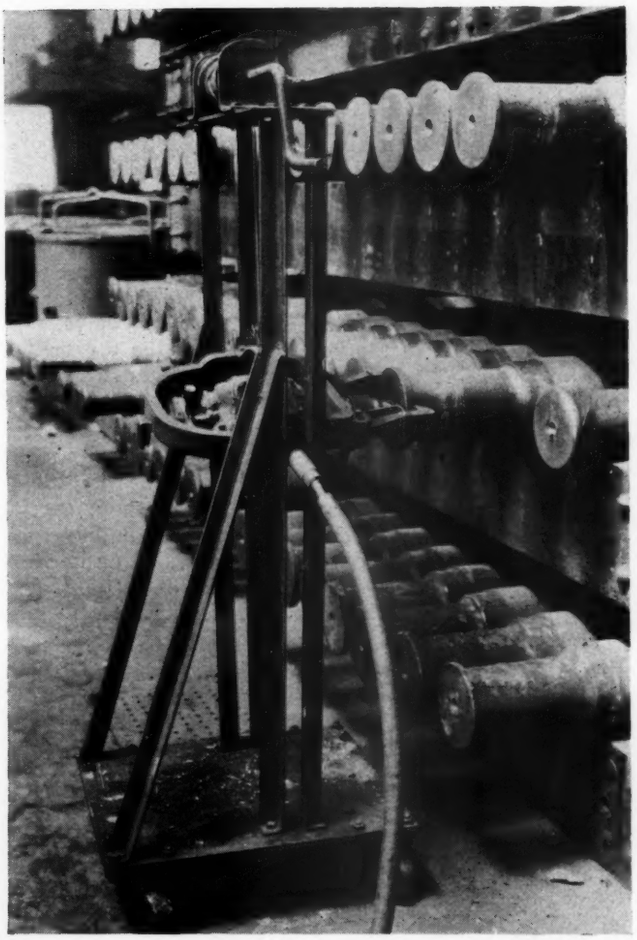
Balanced air lifting device used in handling wheels at the boring mill

shops, but has been adapted to the local shop requirements. It consists essentially of a hinged wheel-lifting unit used to raise new wheels from a vertical position on the shop floor to a horizontal position on a level with the boring-mill table, a balanced rotating steel frame serving to place a new wheel on the boring-mill table, while the bored wheel is being removed. The hinged wheel-lifting unit, or supporting stand, as it is called, is operated by a 6-in. by 16-in. air cylinder. It is designed so that, when in the lowered position, the wheel flange rests directly on the shop floor and wheels may be readily removed from it, or rolled into position and leaned against it.

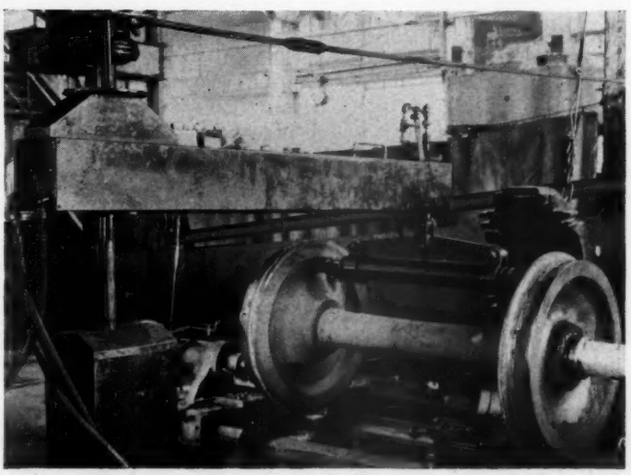
The balanced light steel frame used in transferring wheels is about 70 in. long. It is equipped with three-point tongs at each end and is supported at the center on the piston rod of an air cylinder with 6 in. vertical lift and is arranged for easy rotation on this supporting piston rod. The three-point tongs automatically spread and grip the wheel flanges when the supporting beam is lowered. By applying air pressure in the cylinder both wheels are lifted simultaneously and the new wheel may be easily swung through a semi-circle while the finish bored wheel is transferred to the hinged stand. By releasing the tongs and again elevating the supporting beam it may be swung out of the way so that the new wheel may be centered in the boring-machine chuck and rebored. The finished wheel is lowered to the floor during this operation and rolled to the wheel press ready for application on an axle. Control of both air cylinders used in handling wheels at the boring mill is provided by means of air valves located within easy reach of the operator.

Hinged wheel-supporting stand, which is operated by a 6-in. by 16-in. air cylinder

A special air-operated swing crane gives effective service in handling mounted car wheels to and from the journal lathe. This is in reality a combined wheel hoist and swing crane with a 7-ft. steel boom arranged to swivel about a 3-in. vertical shaft which is capable of 12 in. movement up and down by means of a 16-in. air cylinder mounted under the shop floor. The vertical shaft is supported at both the top and bottom by bearings of special design to reduce friction, and it will be observed that tie rods which position the upper bearing are equipped with turn buckles to give accurate adjustment so that the boom will swing easily in either direction, but be sufficiently well balanced so as not to be moved by its own weight.



Portable device for reboring axle centers to the correct angle



Special equipment for handling mounted car wheels to and from the journal lathe

Referring to the illustration, it will be noticed that the outer end of the boom is equipped with a double-acting air cylinder, 4 in. by 39 in., with special jaws on the piston-rod ends to contact the wheels firmly below the flanges and thus enable them to be lifted from the shop floor and readily swung into position between the lathe centers. This double-acting air cylinder and the supporting bar and link are so designed that the wheels are held in a well balanced horizontal position. The actual work of centering the axle in the lathe is easily performed, owing to the provision of an axle rest bolted to each tail stock and bringing the axle centers practically in line with the lathe centers without numerous up-and-down adjustments of the crane height. Air-operating valves are within easy reach of the lathe hand, and the use of this type of wheel hoist and swing crane enables car wheels to be handled into and out of the journal lathe quickly and with a minimum of manual labor.

Axle Carriers and Centering Device

To facilitate handling axles about the shop, special axle carriers have been developed which not only tend to avoid journal damage but enable axles to be handled with the overhead traveling crane and stacked in piles four or more high, which conserves floor space. The axle carriers, 62 in. wide by 12 ft. long, consist of two 10-in. side channels, joined at the ends by steel castings, which are in effect 10-in. channels with an integral steel band at each end for engagement with the crane hook and also an upward projecting steel foot at each corner which serves to prevent the axles from rolling off the carrier and also enables the carriers to be stacked when desired. In addition to other advantages, these carriers enable axles of similar size to be segregated and moved as a unit above the shop, thus saving time and labor in rehandling. Each carrier holds 15 A. A. R. standard axles.

The two journal lathes used at this shop are equipped with roller bearing centers, floating chucks, center rests attached to the tail stocks, and turret heads holding two rollers, two turning tools and one fillet tool. An average of 12 axles per lathe are turned out during each 8-hr. day. Lathe hands caliper the wheel fits and mark each axle with the exact micrometer size, which saves recalipering by the boring-mill operator.

The axle center reboring machine, shown in one of the illustrations, is a portable device which assures the maintenance of accurate axle center holes, machined smooth and to the correct angle of 60 deg. corresponding to that of the lathe centers. This device consists of a 19-in. by 22-in. base plate mounted on small roller wheels and supporting a 1½-in. angle framework which is 49 in. high and braced as shown in the illustration. A small windlass at the top of this frame supports, by means of a light wire cable, a special frame carrying an air motor which may thus be moved up and down to suit the height of the axle center being bored. The handles of the air motor project through the angle sides which serve to guide the frame and the motor in its vertical movement. The air-motor supporting frame is equipped on the outer end with two dogs which engage the journal collar on opposite sides and are held in position under spring tension so that, when the air motor and boring tool are centered, operation of the motor feed screw will bring pressure against the cutter and rebore and retrue the axle center to the correct angle.

When the Battle Creek car-wheel shop is operating on a full production basis with a wheel gang consisting of four machinists, one car man and one car-man helper, the average production is about 460 pair of cast-iron and 90 pair of steel wheels per month.

Air Brake Questions and Answers

D-22-A Passenger Control Valve (Continued)

450—*Q.—What is the duty of the service slide valve?* A.—It opens and closes ports and passages between: (1) Auxiliary reservoir and the chamber on the face of the release piston past the graduating valve in application position; (2) quick-service volume and atmosphere in release position, or between this volume and brake pipe through the graduating valve in preliminary quick service position; (3) between the brake pipe and displacement reservoir (through quick action service limiting valve) during the first stage service application; (4) auxiliary reservoir past the graduating valve to the displacement reservoir in service position; (5) between the auxiliary reservoir and the release insuring valve with the slide valve in release position and between the slide valve exhaust and the release insuring valve with the slide valve in application position.

451—*Q.—What is the purpose of the service piston return spring and cage?* A.—To prevent movement of the service piston beyond release position unless the brake pipe pressure is about 3 lb. higher than the auxiliary reservoir.

452—*Q.—What prevents the possibility of the graduating valve being blown off its seat?* A.—Brake pipe pressure under the graduating valve is cut off by the slide valve.

453—*Q.—What is the duty of the emergency reservoir charging and ball check?* A.—It permits the brake pipe air to charge the emergency reservoir and prevents back flow.

454—*Q.—What is the duty of the supply reservoir charging and ball check?* A.—It permits the flow of air from the brake pipe to the supply reservoir but prevents back flow.

455—*Q.—What is the purpose of the back flow and ball check?* A.—It serves to prevent flow of displacement reservoir air into the brake pipe at such time that the displacement reservoir pressure is higher than the brake pipe.

456—*Q.—What is the function of the release piston and slide valve?* A.—It opens and closes the passage between the auxiliary reservoir and the emergency reservoir and between the displacement reservoir and exhaust.

457—*Q.—What is the function of the quick service choke plug?* A.—It controls the rate of flow of the brake pipe air to the quick service volume during preliminary quick service of the displacement reservoir during the first stage service.

458—*Q.—What is the purpose of the duplex release valve?* A.—It permits manual reduction of the auxiliary and emergency reservoir pressure.

459—*Q.—For what purpose is the quick service volume?* A.—It provides a predetermined volume into which the brake pipe air flows to initiate preliminary quick service.

460—*Q.—What is the purpose of the preliminary quick service exhaust choke plug?* A.—It controls the continuous exhaust of the quick service volume air to the atmosphere and provides the secondary quick service function.

461—*Q.—What is the purpose of the graduated release choke?* A.—It controls the rate of recharging the auxiliary reservoir from the emergency reservoir during quick recharge and graduated release.

462—*Q.—What is the duty of the quick service limiting portion?* A.—It terminates quick service activity after a 14-lb. brake cylinder pressure is developed.

463—*Q.—What does the emergency portion contain?* A.—Emergency piston, emergency graduating valve, emergency slide valve, emergency piston return spring, emergency piston spring, emergency valve spill over check valve and ball check, accelerated release check valve and ball check, diaphragm spring and slide valve strut, charging choke plug vent piston choke and vent valve cylinder cover choke.

464—*Q.—What is the duty of the emergency piston?* A.—It operates the graduating valve when a service brake pipe reduction is made and also the slide valve in an emergency.

465—*Q.—What is the duty of the emergency graduating valve?* A.—It controls the flow of air from the quick action chamber to the atmosphere during emergency application.

466—*Q.—What is the duty of the emergency slide valve?* A.—It controls the flow of air from: (1) The quick action chamber through the graduating valve to atmosphere during service application, (2) the quick action chamber to vent valve piston during emergency application, (3) the emergency reservoir to the spring side of the emergency valve except during emergency application, (4) the spring side the emergency valve to atmosphere during emergency application, (5) the displacement reservoir past the accelerated release check to the brake pipe during the release after an emergency, and (6) the displacement reservoir to the safety valve during a service application and cuts off this connection during an emergency application.

467—*Q.—What is the duty of the vent valve and piston?* A.—To vent brake pipe air to the atmosphere during an emergency application.

468—*Q.—What is the purpose of the emergency piston return spring and cage?* A.—It returns the emergency piston during release cycles from accelerated release to normal release position when the quick action chamber pressure recharges to approximately brake pipe pressure.

469—*Q.—What is the purpose of the emergency piston spring?* A.—To stabilize emergency portion against undesired emergency.

470—*Q.—What is the duty of the emergency valve?* A.—It connects the emergency reservoir air to the displacement reservoir during the emergency application.

471—*Q.—What is the purpose of the spill-over check valve and ball check?* A.—To provide against overcharge of the quick action chamber.

Improved Power-Driven Forge Hammers

The line of power-driven forge hammers formerly made and sold for many years as Moloch power hammers, has been improved in a number of important details and is now being manufactured and sold by the D. J. Murray Manufacturing Company, Wausau, Wis. This hammer is made in five different sizes for general forging work, namely, 25-lb., 50-lb., 100-lb., 250-lb., and 500-lb., the 100-lb. and 250-lb. sizes being illustrated. In railway forge shops these hammers are well adapted to a wide variety of operations, including the forging of such parts as chisel blanks, coil-spring ends, wheel-lathe tools, brake hangers, spring hanger clips, etc.

The improved Murray hammer is said to be extremely powerful, yet simple in design and easy to operate. The ram is held in rigid alinement with the frame, and V-ram guides are of ample size, made of semi-steel and easily adjustable for taking up wear. This arrangement enables the constant maintenance of full length bearing and assures accurate alinement of the dies. The ram connection provides a cushion at the upper extremity of the stroke and imparts a multiplied impetus to the downward stroke. Steel castings, alloy steel forgings, and high grade steel springs and arm pins are used in this assembly. The bearings are lined with removable bushings and the crank bearing is extra long and split to allow taking up for wear. The friction clutch spider is of the cone type, leather faced, and gives the operator accurate control of speed and weight of blow. The pulley has a removable bushing on a steel shaft. The friction clutch spider is held in position on the shaft by a taper pin which can be removed in a few seconds.

The dies, made of special die steel, accurately machined and tempered, are keyed in machined slots and set at an angle which enables the working of long bars without interference with the frame. Standard dies are either flat or rounded on the face. Unless otherwise specified, they are furnished with a flat forging face on the three larger sizes.

The pulley and rear shaft bearing are lubricated by means of a grease cup working through a hollow shaft. The front shaft bearing is lubricated with a grease cup, other friction points being hand-oiled and easily accessible.

Murray hammers are adaptable to a wide range of work without adjustment, such as alternate blows on the flat and edge of rectangular stock. Yet adjustment for different thicknesses of dies and material is provided. A split steel crosshead, clamped to the steel connecting rod can be shifted up and down quickly and easily.

Improved Murray 100-lb. and 250-lb. power-driven forge hammers

The 100-lb. hammer, illustrated, has a die of face 6 in. by 3 in., and a forging capacity for general work up to 4 in. round, the throw of the crank being 6½ in., the maximum stroke 12 in., and throat depth, 14½ in. The machine is belt-driven, with a pulley speed of 275 r.p.m. The 250-lb. hammer, which is provided with direct motor drive from a 5-hp. electric motor, has a die face 8 in. by 4 in., and forging capacity up to 6 in. round. The throw of the crank is 8 in., maximum stroke 15 in., depth of throat 15½ in., and pulley speed 220 r.p.m.

High Spots in
Railway Affairs . . .

Progress in Railroad Legislation

The Senate has completed its work on transportation legislation for this session of Congress. On May 25 it adopted the Wheeler-Truman bill, which puts water carriers under Interstate Commerce Commission regulation and codifies the Interstate Commerce Act. On May 27 and May 29 it passed, respectively, the railroad reorganization court measure, and the Chandler voluntary reorganization bill. The former measure establishes a special court of five members for railway reorganization proceedings and contains provisions intended to insure the soundness of the financial structures emerging from the reorganization process. The latter measure applies only to the Baltimore & Ohio and the Lehigh Valley and, if the House, in conference agrees to the Senate amendments, will assure that the large amount of work already done on the debt-adjustment plans of these two roads will not go for naught. The only one of the three bills which promises any basic correction in transportation conditions is the Wheeler-Truman bill. If approved by the House, the two-year studies of the relative economy of various modes of transport and of government aids to transport, which the bill requires to be made by a three-member board appointed by the President, promises even more in ultimate fairness to the railroads than may be expected in practical results from the regulation of water carriers by the Interstate Commerce Commission. The prospects for passage by the House at this session are uncertain.

Motor Trucks Getting the Business

During the first quarter of this year revenue freight-car loadings were 6,990,264, an increase of 5.4 per cent over the loadings for the same period in 1938. The American Trucking Association publishes monthly reports of the freight tonnage transported by motor carriers. In January of this year, for instance, reports from 231 motor carriers in 41 states, showed a tonnage of 780,460, an increase of 26.5 per cent over the same month in 1938. In February, 212 motor carriers in 40 states transported 797,031 tons, an increase of 25.7 per cent for the same carriers over February, 1938. In March, 210 motor carriers in 38 states transported an aggregate of 896,324 tons, an increase of 23.4 per cent, as compared to March, 1938. It is difficult to combine these figures with accuracy because of the different number of carriers involved in each of the three months, but it would seem that for the three months the increase in tons carried by the motor trucks was between 24 and 25 per cent, as compared to an increase of 5.4 per cent in revenue freight car loadings.

McManamy and Meyer Leave I. C. C.

Probably no other Interstate Commerce Commissioner has been so well known to the mechanical department officers and employees as Frank McManamy. Moreover, in a group which is noted for hard workers, it is doubtful whether any other commissioner has ever worked harder or more faithfully on the job than Mr. McManamy. He was also one of the very few commissioners who have had extensive practical railroad experience. Just why the Administration could not see its way clear to continue him in service until his seventieth birthday will probably never be known to the general public. It is understood that Mr. McManamy will retire to a home which he has purchased at Daytona Beach, Fla. Almost at the same time, and on his own request, Commissioner Balthasar H. Meyer was released from service by the President, on May 1. Mr. Meyer served longer than any other commissioner in I. C. C. history, having held that office since January, 1911. He has opened an office in Washington as a consultant in transportation matters.

Purchases During First Quarter

The railroads have enjoyed better business thus far this year than they did in 1938, although the increase is not nearly as great as was anticipated early in the year. Increased revenues for the railways are naturally reflected in increased purchases, and it is not surprising, therefore, to find that purchases during the first quarter of this year were much better than for the corresponding period last year. According to the Railway Age, materials, exclusive of fuels, received from manufacturers in the first quarter of this year totaled $119,424,000, as compared with $89,850,000 during the first quarter of 1938, an increase of 33 per cent. Orders for new locomotives and cars from builders totaled approximately $20,680,000, as compared with $9,537,000 for the first quarter of 1938. Fuel purchases increased from $62,830,000 in 1938, to $76,896,000 for the first quarter this year. While the total purchases for the first three months this year were 40 per cent less than for the first three months of 1937, they were larger than in any other corresponding period of the last nine years, except for that year.

A Great Leader Passes

Carl R. Gray, vice-chairman of the board of directors of the Union Pacific, who passed away on May 9, 1939, may well be regarded as one of the outstanding railway leaders of America. They said he retired when he gave up the presidency of the Union Pacific on October 1, 1937, but the interval between that time and his death was one of the busiest and most productive in his long railroad service. Thoroughly grounded in the techniques of railroading, because of his keenness, and the wide variety of experiences in climbing from the very bottom to become the chief executive of one of America's great railroads, he had an unusually thorough understanding of railroad problems. More than that, however, he understood human nature and knew how to exercise that fine type of leadership that inspired confidence and loyalty, as well as enthusiasm among his followers. During the past year and a half he worked unceasingly to bring about a satisfactory solution of the grave problems which the railroads as a whole are facing in this country today. He was, indeed, the railroads' minister-at-large, and the transportation industry has lost a leader of high ideals, with keen and farsighted perception.

Safety in 1938

The National Safety Council announced the results of its twelfth annual award in the Railroad Employees' National Safety Contest on May 15. It takes considerable satisfaction in noting that there has been a renewal of interest in the safety program, since the results approximate more nearly those of the best safety year on the railroads, 1933, than has been true in recent years. The Union Pacific System again leads in Group A (50 million or more man-hours), thus topping this particular group for 11 out of 16 years. The Western Region of the Pennsylvania Railroad heads Group B (20 million to 50 million man-hours); the Chicago, St. Paul, Minneapolis & Omaha heads Group C (8 million to 20 million man-hours); the Duluth, Missabe & Iron Range, Group D (3 million to 8 million man-hours); the Detroit, Toledo & Ironton, Group E (1 million to 3 million man-hours), and the Lake Superior & Ishpeming, Group F (less than 1 million man-hours). In the Pullman Company auxiliary contest the Chicago Central Zone captured the first place. The records of the Pullman Buffalo shop surpassed those of the five other Pullman shops. Of the Class 1 switching and terminal roads the Ogden Union Railway & Depot Company led in Group A and the Lake Terminal Railroad Company led Group B.

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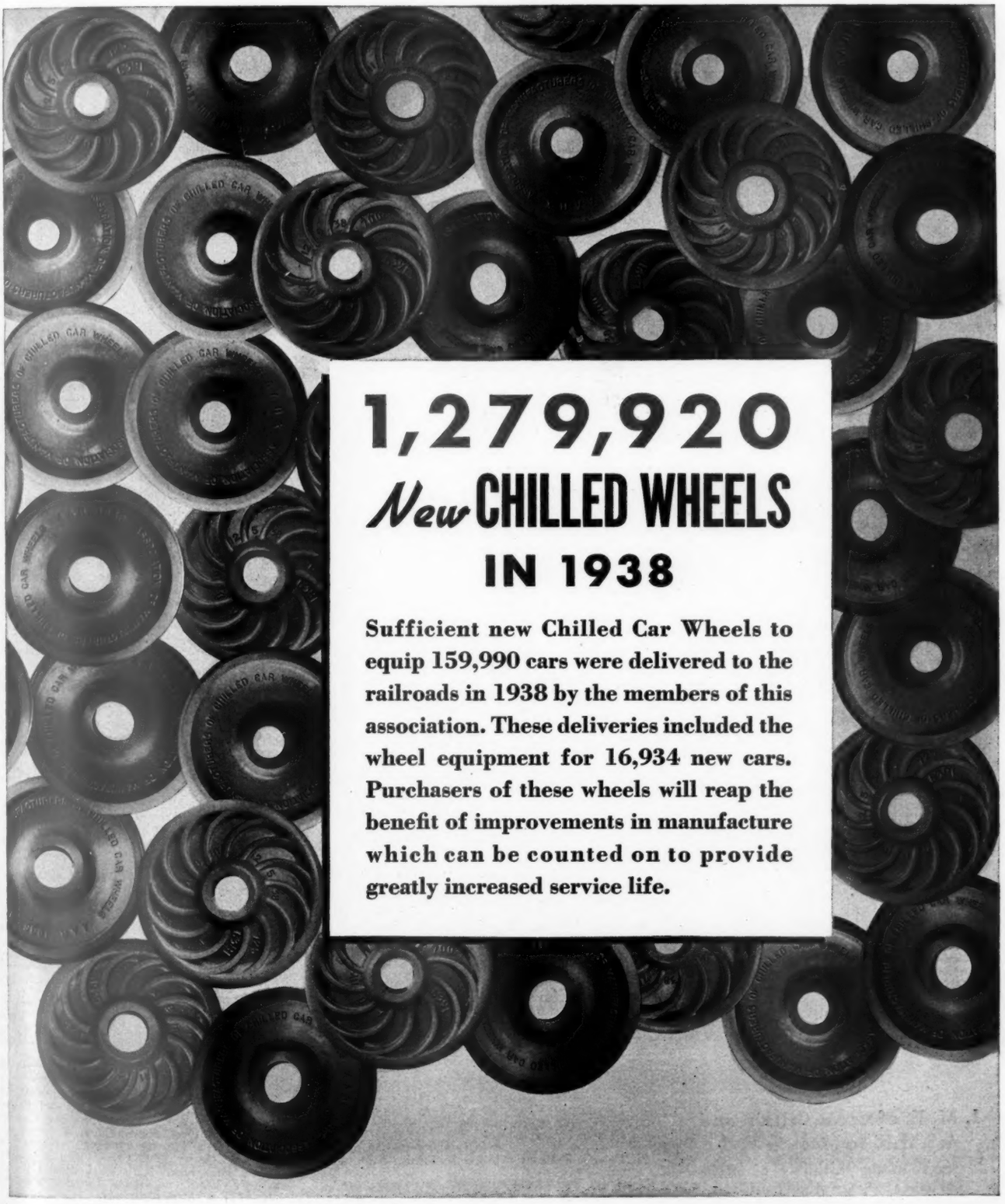

1,279,920 *New* CHILLED WHEELS IN 1938

Sufficient new Chilled Car Wheels to equip 159,990 cars were delivered to the railroads in 1938 by the members of this association. These deliveries included the wheel equipment for 16,934 new cars. Purchasers of these wheels will reap the benefit of improvements in manufacture which can be counted on to provide greatly increased service life.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

230 PARK AVENUE,
NEW YORK, N. Y.

445 N. SACRAMENTO BLVD.,
CHICAGO, ILL.

AMCCW

ORGANIZED TO ACHIEVE:
Uniform Specifications
Uniform Inspection
Uniform Product

Among the Clubs and Associations

Mechanical Division Annual Meeting Program

THE sessions of the 17th annual meeting of the Association of American Railroads, Mechanical Division, scheduled to be held at New York, June 28 to 30, inclusive, will convene each morning at 9 a. m., Daylight Saving Time, at the Commodore Hotel and adjourn at 1 p. m. or as soon thereafter as possible, in order to give the members an opportunity to inspect the transportation exhibits at the New York World's Fair. The following is a program of the meeting:

WEDNESDAY, JUNE 28, 1939

Meeting called to order
Address by J. W. King, vice-president, operations and maintenance department, Association of American Railroads
Address by Chairman F. W. Hankins, chief of motive power, Pennsylvania
Action on minutes of annual meeting of 1937
Appointment of Committee on Subjects, Resolutions, Correspondence, etc.
Unfinished business
New business
Report of General Committee
Report of Nominating Committee
Discussion of Reports on:
- Lubrication of Cars and Locomotives
- Specifications for Materials
- Wheels
- Brakes and Brake Equipment

Adjournment

THURSDAY, JUNE 29, 1939

Meeting called to order
Discussion of reports on:
- Arbitration
- Prices for Labor and Materials
- Tank Cars
- Loading Rules
- Couplers and Draft Gears
- Car Construction

Adjournment

FRIDAY, JUNE 30, 1939

Meeting called to order
Individual paper on Operation of Diesel Locomotives, by H. H. Urbach, mechanical assistant to executive vice-president, Chicago, Burlington & Quincy
Discussion of reports on:
- Locomotive Construction
- Further Development of the Reciprocating Steam Locomotive
- Joint Committee on Utilization of Locomotives and Conservation of Fuel

Election of members of General Committee
Adjournment

I. M. E. of Great Britain and A.S.M.E. to Meet in Fall

MEMBERS of the Institution of Mechanical Engineers of Great Britain and the American Society of Mechanical Engineers will meet at New York September 4 to 8. Joining also in this meeting will be the Institution of Civil Engineers and the Engineering Institute of Canada, who are meeting with the American Society of Civil Engineers. A single printed program will include the events for both the mechanical- and civil-engineering groups, who will join in an opening session on the afternoon of Labor Day, Monday, September 4, at the Engineering Societies Building. On the mornings of the succeeding days mechanical-engineering sessions will be held as follows: Tuesday, September 5, Marine Transportation; Wednesday, September 6, Railroad Transportation; Thursday, September 7, Highway Transportation, and Friday, September 8, Transatlantic Airplane Transport.

Two papers on Lightweight High-Speed Trains have been prepared for presentation at the Railroad Transportation session. William A. Stanier, chief mechanical engineer, London, Midland & Scottish Railway, London, England, will be the speaker for the British engineers, and Charles T. Ripley, chief engineer, Technical Board, Wrought Steel Wheel Industry, Chicago, for the American engineers.

DIRECTORY

The following list gives names of secretaries, dates of next regular meetings, and places of meetings of mechanical associations and railroad clubs:

AIR-BRAKE ASSOCIATION.—R. P. Ives, Westinghouse Air Brake Company, 3400 Empire State building, New York.

ALLIED RAILWAY SUPPLY ASSOCIATION.—J. F. Gettrust, P. O. Box 5522, Chicago. Meeting October 17, 18, and 19, Hotel Sherman, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, 11402 Calumet avenue, Chicago.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—C. E. Davies, 29 West Thirty-ninth street, New York.

RAILROAD DIVISION.—Marion B. Richardson, P. O. Box 205, Livingston, N. J.

MACHINE SHOP PRACTICE DIVISION.—Erik Aberg, editor, Machinery, 148 Lafayette St., New York.

MATERIALS HANDLING DIVISION. — F. J. Shepard, Jr., Lewis-Shepard Co., Watertown Station, Boston, Mass.

OIL AND GAS POWER DIVISION. — M. J. Reed, 2 West Forty-fifth street, New York.

FUELS DIVISION.—A. R. Mumford, Consolidated Edison Co., 4 Irving Place, New York.

ASSOCIATION OF AMERICAN RAILROADS. — J. M. Symes, vice-president operations and maintenance department, Transportation Building, Washington, D. C.

OPERATING SECTION. — J. C. Caviston, 30 Vesey street, New York.

MECHANICAL DIVISION.—V. R. Hawthorne, 59 East Van Buren street, Chicago. Annual meeting June 28, 29 and 30, at the Commodore Hotel, New York.

PURCHASES AND STORES DIVISION.—W. J. Farrell, 30 Vesey street, New York. Convention of entire membership, June 14-15, Palmer House, Chicago.

MOTOR TRANSPORT DIVISION.—George M. Campbell, Transportation Building, Washington, D. C.

CANADIAN RAILWAY CLUB. — C. R. Crook, 4468 Oxford avenue, Montreal, Que. Regular meetings, second Monday of each month, except June, July and August, at Windsor Hotel, Montreal, Que.

CAR DEPARTMENT ASSOCIATION OF ST. LOUIS.—J. J. Sheehan, 1101 Missouri Pacific Bldg., St. Louis, Mo. Regular monthly meetings third Tuesday of each month, except June, July and August, Hotel Mayfair, St. Louis, Mo.

CAR DEPARTMENT OFFICERS' ASSOCIATION.—Frank Kartheiser, chief clerk, Mechanical Dept., C. B. & Q., Chicago. Meeting October 17, 18, and 19, Hotel Sherman, Chicago.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—G. K. Oliver, 2514 West Fifty-fifth street, Chicago. Regular meetings, second Monday in each month, except June, July and August, La Salle Hotel, Chicago.

CAR FOREMEN'S ASSOCIATION OF OMAHA, COUNCIL BLUFFS AND SOUTH OMAHA INTERCHANGE.—H. E. Moran, Chicago Great Western, Council Bluffs, Ia. Regular meetings, second Thursday of each month at 1:15 p. m.

CENTRAL RAILWAY CLUB OF BUFFALO. — Mrs. M. D. Reed, Room 1817, Hotel Statler, Buffalo, N. Y. Regular meetings, second Thursday each month, except June, July and August, at Hotel Statler, Buffalo.

EASTERN CAR FOREMAN'S ASSOCIATION. — Roy MacLeod, Room 127, G. O. Bldg., N. Y., N. H. & H., New Haven, Conn. Regular meetings, second Friday of each month, except May, June, July, August and September.

INDIANAPOLIS CAR INSPECTION ASSOCIATION. — R. A. Singleton, 822 Big Four Building, Indianapolis, Ind. Regular meetings, first Monday of each month, except July, August and September, at Hotel Severin, Indianapolis, at 7 p. m.

INTERNATIONAL RAILWAY FUEL ASSOCIATION. — See Railway Fuel and Traveling Engineers' Association. Meeting third week in October, Hotel Sherman, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—F. T. James, general foreman, D. L. & W., Kingsland, N. J. Meeting October 17, 18, and 19, Hotel Sherman, Chicago.

INTERNATIONAL RAILWAY MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central, 2347 Clark avenue, Detroit, Mich. Annual meeting October 17, 18, and 19, Hotel Sherman, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—A. F. Stiglmeier, secretary, 29 Parkwood street, Albany, N. Y. Annual meeting, October 17, 18, and 19, Hotel Sherman, Chicago.

NEW ENGLAND RAILROAD CLUB. — W. E. Cade, Jr., 683 Atlantic avenue, Boston, Mass. Regular meetings, second Tuesday in each month, except June, July, August and September, at Hotel Touraine, Boston.

NEW YORK RAILROAD CLUB.—D. W. Pye, Room 527, 30 Church street, New York. Meetings, third Friday in each month, except June, July, August, September, at 29 West Thirty-ninth street, New York.

NORTHWEST CAR MEN'S ASSOCIATION. — E. N. Myers, chief interchange inspector, Minnesota Transfer Railway, St. Paul, Minn. Meetings, first Monday each month, except June, July and August, at Midway Club rooms, University and Prior avenue, St. Paul.

PACIFIC RAILWAY CLUB. — William S. Wollner, P. O. Box 3275, San Francisco, Cal. Regular meetings, second Thursday of each month in San Francisco and Oakland, Calif., alternately, excepting June in Los Angeles and October in Sacramento.

RAILWAY CLUB OF GREENVILLE.—Sterle H. Nottingham, Greenville, Pa. Regular meetings, third Thursday in month, except June, July and August.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 1941 Oliver Building, Pittsburgh, Pa. Regular meetings, fourth Thursday in month, except June, July and August, Fort Pitt Hotel, Pittsburgh, Pa.

RAILWAY FIRE PROTECTION ASSOCIATION.—P. A. Bissell, 40 Broad street, Boston, Mass.

RAILWAY FUEL AND TRAVELING ENGINEERS' ASSOCIATION.—T. Duff Smith, 1255 Old Colony building, Chicago. Annual meeting October 17, 18, and 19, Hotel Sherman, Chicago.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION. —J. D. Conway, 1941 Oliver Building, Pittsburgh, Pa. Meets with Mechanical Division and Purchases and Stores Division, Association of American Railroads.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings, third Thursday in January, March, May, July and September. Annual meeting, third Thursday in November, Ansley Hotel, Atlanta, Ga.

TORONTO RAILWAY CLUB.—D. M. George, Box 8, Terminal A, Toronto, Ont. Meetings, fourth Monday of each month, except June, July and August, at Royal York Hotel, Toronto, Ont.

TRAVELING ENGINEERS' ASSOCIATION.—See Railway Fuel and Traveling Engineers' Association.

WESTERN RAILWAY CLUB.—W. L. Fox, executive secretary, Room 822, 310 South Michigan avenue, Chicago. Regular meetings, third Monday in each month, except June, July, August and September.

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METHODS AND MACHINERY THAT GUARD LIMA QUALITY

RIVETING *is automatically controlled at Lima*

Here is a "behind-the-scenes" view of the Lima bull-riveter. » » » No guessing here as to whether the riveting pressure has done its job. » » » Controls are automatically set to provide the proper riveting time, varying with size of plate and rivet. » » » This is just one of the numerous precautions taken at Lima to safeguard quality and build low-maintenance into its product.

LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA LOCOMOTIVE WORKS, INCORPORATED, LIMA, OHIO

NEWS

Cost of Injuries Going Up

SAFETY in the mechanical and maintenance-of-way departments of the railroads was the major topic of discussion at a regional safety meeting of the Safety Section of the Association of American Railroads held in conjunction with the Seventeenth Annual Midwest Safety Conference at Chicago on May 10. Among those addressing the meeting were W. T. Faricy, general solicitor of the Chicago & North Western, who spoke on Employer Financial Responsibility for Accidents to Employees; C. M. House, superintendent of motive power and equipment of the Alton, who spoke on the Mechanical Department's Responsibility in Accident Prevention; G. M. O'Rourke, district engineer of the Northern Lines of the Illinois Central, who spoke on Safety Promotional Work in Railroad Maintenance of Way and Structures; Warren E. Fuller, assistant to the vice-president, traffic department, of the Chicago, Burlington & Quincy, whose subject was Safety's Contribution Economically and Socially, and W. H. Emerson, general master car builder of the Elgin, Joliet and Eastern, who talked on Safety in the Car Department.

Mr. Faricy discussed laws governing accidents to employees, showing how, during 35 years, the common law of master and servant under which the employer's liability was narrow has developed into present laws under which, if an employee is injured or killed in the course of his employment the employer or his insurance company pays medical, surgical and hospital bills, or funeral expenses as the case may be, and a weekly allowance to the injured man during the period of his disability or to his widow and orphans up to a certain prescribed amount. As a result, he said, the prevention of an accident today means a lot more money than it did 35 years ago. In Wisconsin, for instance, he continued, where the North Western became subject to the State Workmen's Compensation Act in 1917, the weekly compensation indemnity then required by the act was $9.75. That was the maximum weekly payment required at that time for any one injury. Now the maximum has risen to $21 a week. As of that time, the maximum indemnity provided for an injured man thirty-five years of age was $7,605. At the present time, an employee of that same age, injured under the same circumstances, may recover up to a maximum of $38,220.

At present, he said, there are pending in Congress several proposals which would further amend the Federal Employers Liability Act in favor of the employee and give rights of recovery to injured persons in many cases where none exist under present law. Some of these bills have already been reported favorably by committees and, if they pass, their inevitable effect will be to increase further the amounts payable for personal injuries.

Mr. House discussed the safety movement on his railroad, which resulted in a record of no federal defects reported by Interstate Commerce Commission inspectors on locomotives so inspected for a period of two fiscal years. He emphasized the need for discipline. On the Alton, he said, when an accident occurs, whether reportable or non-reportable, the man involved is immediately called by the foreman for investigation. Unless he can show good explanation for the injury, his personal record is assessed with discipline. It is seldom, he continued, that the same employee is responsible for a second reportable accident, indicating there is profit in experience.

"Safety educational work to be successful," according to Mr. O'Rourke, "must come down from the top. The great mass of men follow leaders. They may protest against the fact, but they do it all the same, for they cannot help it, and when we pass judgment on the employee, we are obliged to inquire what kind of an example has been set him by his employer." He stressed also the effectiveness of friendly competition as a stimulus for good safety records.

Dr. Zay Jeffries Honored

DR. ZAY JEFFRIES, eminent metallurgist, has been elected to membership in the National Academy of Sciences. The election was announced at a luncheon in the Union Club in Cleveland on May 12. In congratulating Dr. Jeffries, the president of Case Institute, Dr. William E. Wickenden said: "You are inheriting the place of two world figures. As a Clevelander you are succeeding Ambrose Swasey, eminent industrialist, patron of science and doer of good works; as a scientist you are succeeding Albert Sauveur, pre-eminent in the art of metallography."

Dr. Jeffries has contributed numerous important developments in the science of metals as a result of his research with tungsten lamp filaments, high strength aluminum alloys, and the application of x-ray analysis to metallurgy. During the period from 1932 to 1936, he was president of Carboloy Company, Inc., and since that time has served as chairman.

Retirement Board Appoints Twelve Regional Directors

APPOINTMENT of regional directors for the 12 administrative regions of the Railroad Retirement Board's field operations was recently announced by the Board. The main functions of the regional offices in charge of the regional directors will be to administer the Railroad Unemployment Insurance Act which goes into effect July 1.

According to a plan of decentralized field operation, unemployment insurance claims will be received initially by designated agents of the railroads or other employers under the Act. The claims will then be sent to the regional offices for adjudication and certification for payment. The location of the regional offices, the Board's announcement said, "has been planned in co-operation with the railroads and railroad labor organizations and follows the general pattern of the rail systems of the country, particularly in relation to the location of railroad pay points and of treasury disbursing offices."

The names of the regional directors and the regions to which they are assigned are as follows:

George H. Parker, director of Region I with headquarters at Boston, Mass. This region includes all the New England states.

Alexander Fleisher, director of Region II with headquarters at New York. This region includes the states of New York; New Jersey; Pennsylvania, east of Pittsburgh; Delaware; Maryland; a small section of northeastern West Virginia; and the Cape Charles peninsula of Virginia.

Carlton Hayward, director of Region III with headquarters at Cleveland, Ohio. This region includes Pennsylvania, Pittsburgh and west; Ohio; Michigan; the eastern half of West Virginia; and northeastern and central Kentucky.

(*Continued on next left-hand page*)

* * *

The "William Crooks," hauling two ancient coaches, on its recent trip from St. Paul, Minn., to become a part of the exhibition, Railroads on Parade, at the New York World's Fair—The locomotive now owned by the Great Northern, was built at Paterson, N. J., in 1861

LIGHTER IN WEIGHT

EASIER TO MAINTAIN

Weight has been reduced by more than half without sacrifice of strength or efficiency in the New Franklin No. 8 Combined Lubricator and Spreader. » » » This fabricated steel unit with reversible cellar and reduced distance between the hub and perforated plate provides better hub lubrication. The improved spreader maintains driving box jaws in parallel and prevents loose crown bearings. A new type of end plate makes a tight fit to exclude dust and other foreign matter. The new cellar permits reversal of tapered grease cakes which now are renewed. This saves labor and reduces the cost of lubrication. » » » For all replacements and new locomotives specify the Franklin No. 8 Lubricator and Spreader.

When maintenance is required, a replacement part assumes importance equal to that of the device itself and should be purchased with equal care. Use only genuine Franklin repair parts in Franklin equipment.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

Francis E. Fleener, director of Region IV with headquarters at Chicago. This region includes the states of Indiana; Illinois; Iowa, with the exception of the southwestern corner; southern and northeastern Wisconsin; and southeastern Kentucky.

Walter Burr, director of Region V with headquarters at Richmond, Va. This region includes the District of Columbia; Virginia, except for a small area in the southwest and the Cape Charles peninsula; southeastern West Virginia; North Carolina, with the exception of the southwestern portion; and eastern South Carolina.

Leon L. Wheeless, director of Region VI with headquarters at Atlanta, Ga. This region includes the states of Georgia; Florida; Mississippi; Alabama; Tennessee; western South Carolina; western North Carolina; extreme southwestern Virginia; and southern Kentucky.

Harris G. Pett, director of Region VII with headquarters at Minneapolis, Minn. This region includes the states of Minnesota; North Dakota; South Dakota, except for a section in the southwest; eastern Montana; and northwestern Wisconsin.

William A. Murphy, director of Region VIII with headquarters at Kansas City, Mo. This region includes the states of Missouri; Oklahoma, except the tip of the pan handle; Arkansas, except the southwestern corner; Kansas, with the exception of the extreme west; the eastern half of Nebraska; the southwestern corner of Iowa; and a small section of southern South Dakota.

W. A. Rooksbery, director of Region IX with headquarters at Dallas, Texas. This region includes the states of Louisiana; Texas; the southwest corner of Arkansas; southern and eastern New Mexico; and a small piece of southeastern Arizona.

Harry K. Sorenson, temporarily assigned as director of Region X with headquarters at Denver, Colo. This region includes the states of Colorado; Wyoming; Utah; western Nebraska; extreme western Kansas; southwestern South Dakota; southern Idaho; southeastern Oregon; northeastern Nevada; the northern half of Arizona; northern and western New Mexico; and the tip of the Oklahoma pan handle.

Shirl L. Blalock, director of Region XI with headquarters at Seattle, Washington. This region includes the states of Washington; northern Idaho; the western half of Montana; and Oregon, except for the extreme south and west.

James B. Cress, director of Region XII with headquarters at San Francisco, California. This region includes the states of California; most of Nevada; the southern segment of Oregon; southern Arizona; and a small section of southwestern New Mexico.

Research in Steel Technology

RESEARCH in steel technology formerly conducted by The Association of American Steel Manufacturers Technical Committees, with headquarters at Pittsburgh, Pa., has been transferred to the Technical Committees of American Iron and Steel Institute, according to a recent announcement by American Iron and Steel Institute and The Association of American Steel Manufacturers Technical Committees. The offices of the latter Association, which was established some 40 years ago, have been closed.

The standards for chemical compositions, physical properties, rolling tolerances and other permissible variations from specified dimensions originally promulgated by The Association of American Steel Manufacturers Technical Committees will hereafter be sponsored by American Iron and Steel Institute, and will be published as a part of its "Steel Products Manual."

C. E. Brinley Discusses Motive Power in Yale Scientific Magazine

CHARLES E. BRINLEY, president of the Baldwin Locomotive Works, is the author of an article on railroad motive power appearing in a recent "Yale Scientific Magazine." Meeting the oft-repeated criticism that the railroads are not progressive, the writer presents various operating criteria which indicate the basic improvement in railroad speeds and efficiency. In this connection Mr. Brinley notes such refinements in motive power as the application of roller bearings to axles, the use of heat-treated and alloy steels and studies in the reduction of dynamic augment.

Discussing the relative advantage of prime movers in the industry, the Baldwin president expresses the opinion that Diesel-electric is now justly pre-eminent in the switching field and has proved its efficiency to some extent in high-speed passenger service. He believes, however, that something must yet be done in making the Diesel-powered unit more flexible in load capacity and lower in cost.

As for steam locomotives he writes: "It is not unlikely that an important step forward may be found in the use of poppet valves and higher steam pressures and superheat, permitting early cutoffs with a consequent reduction in fuel and water consumption as compared with the best practice of today, and it is entirely possible that small steam units may be developed, which will successfully handle light-weight streamline trains of a few cars, showing at the same time a marked reduction in first cost and interest charges. A Diesel-electric power plant is not by any means an essential feature of a light train."

Equipment Depreciation Orders

EQUIPMENT depreciation rates for the Bevier & Southern, Lake Erie & Eastern and Wichita Northwestern are prescribed by the Interstate Commerce Commission in modifications of previous sub-orders in No. 15,100 Depreciation Charges of Steam Railroad Companies. The Bevier & Southern sub-order prescribed rates as follows: Steam locomotives, 3.01 per cent; freight-train cars, 3.33 per cent. The Lake Erie & Eastern got prescribed rates of 4.81 per cent on steam locomotives and 2.71 per cent on work equipment; while the Wichita Northwestern got 8.55 per cent for steam locomotives, 6.83 per cent for owned freight cars, 3.68 per cent for leased freight cars, 9.52 per cent for passenger-train cars, and 7.72 per cent for work equipment.

Illinois Central Purchases Locomotive Scale

THE Illinois Central has placed an order with Fairbanks Morse & Company for an eighteen-section, plate-fulcrum individual wheel weighing locomotive scale, with a total capacity of 900,000 lb., for its Paducah, Ky., shops.

No A.A.R. Appeal in Automatic Stoker Case

THE Association of American Railroads will not enter an appeal on behalf of the railroads from the recent decision of a three-judge federal court at Cleveland, Ohio, upholding the Interstate Commerce Commission's order in the automatic stoker case. This decision of the A. A. R. became known following April 28's Washington, D. C., meeting of the Association's board of directors.

New Equipment Orders and Inquiries Announced Since the Closing of the May Issue

LOCOMOTIVE ORDERS

Road	No. of Locos.	Type of Loco.	Builder
A. T. & S. F.[1]	13	1,000-hp. Diesel-elec. switch.	Electro-Motive Corp.
	1	4,000-hp. Diesel-elec. pass.	Electro-Motive Corp.
	12	1,000-hp. Diesel-elec. switch.	American Loco. Co.
	5	1,000-hp. Diesel-elec. switch.	Baldwin Loco Wks.
C. B. & Q.	5	600-hp. Diesel-elec. switch.	Electro-Motive Corp.
Great Northern	14	1,000-hp. Diesel-elec. switch.	Electro-Motive Corp.
K-C-S	2	2,000-hp. Diesel-elec.	Electro-Motive Corp.
Lehigh Valley	3	20,000-gal. tenders	American Loco. Co.
Pere Marquette	1	600-hp. Diesel-elec. switch.	Electro-Motive Corp.

LOCOMOTIVE INQUIRIES

A. C. & Y.	2	2-8-2	.....
United Fruit Co.	5	2-8-2	.....

FREIGHT-CAR ORDERS

Road	No. of Cars	Type of Car	Builder
Birmingham Southern	100	Hopper	Pullman-Std. Car Mfg. Co.
	10	Flat	
D. & R. G. W.	400	Box	Pressed Steel Car Co.
	100	Auto-box	
	50	Gondolas	
	100	Underframes	
Ferrocarril al Pacifico	50	30-ton box	Magor Car Corp.
Maine Central	300	Gondolas	Bethlehem Steel Co.
Union Railroad	10	Caboose	Greenville Steel Car Co.
United States Navy	6	50-ton flat	Greenville Steel Car Co.

FREIGHT-CAR INQUIRIES

General Chemical Co.	5 or 10	50- or 70-ton hopper	.....
Lehigh & New England	50 or 100	70-ton bulk cement	.....
Western Maryland	500	50-ton box	.....
	500	50-ton hopper	.....
	100	50-ton gondola	.....
	10	50-ton flat	.....

PASSENGER-CAR INQUIRIES

Road	No. of Cars	Type of Car	Builder
A. T. & S. F.	11	Lightweight	.....
Florida East Coast	See Note[2]		.....

[1] When these locomotives are delivered, the Santa Fe will have 41 Diesel-electric switching locomotives and 11 Diesel-electric passenger locomotives with an aggregate horsepower of 37,500 in switching service and 27,400 in passenger service.

[2] Plans to buy two streamline trains of seven cars each, to be hauled by Diesel-electric locomotives.

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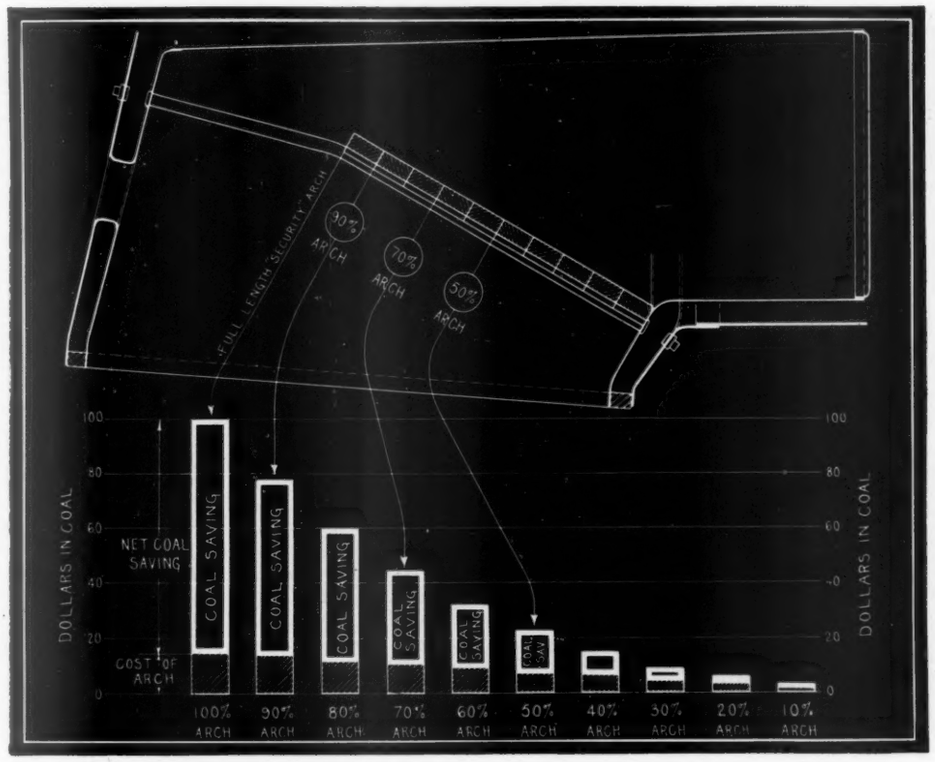

THE EFFECT OF ABBREVIATED ARCHES ON FUEL SAVING

LET THE ARCH HELP YOU SAVE

With the emphasis being placed on saving every railroad dollar, the locomotive Arch becomes increasingly important.

Regardless of the amount of traffic handled, the locomotive Arch saves enough fuel to pay for itself ten times over.

Be sure that every locomotive leaving the roundhouse has its Arch complete with not a single brick nor a single course missing.

In this way, you will get more work for each dollar of fuel expense. Skimping on Arch Brick results in a net loss to the railroad.

THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED
60 EAST 42nd STREET, NEW YORK, N. Y.

Locomotive Combustion Specialists

Supply Trade Notes

MARVIN W. SMITH, has been elected a vice-president of the Westinghouse Electric & Manufacturing Co., with headquarters at Pittsburgh, Pa.

◆

GORDON F. HESS, assistant manager of sales of the Alloy Steel division of the Republic Steel Corporation, Massillon, Ohio, has been appointed sales manager at Houston, Tex.

◆

T. E. BARLOW has been appointed metallurgical engineer of the Copper Iron & Steel Development Association with headquarters at Cleveland, Ohio.

◆

HOWARD G. HILL has resigned as mechanical engineer of the Miller Felpax Company, Winona, Minn., to engage in other business.

◆

THE SYMINGTON-GOULD CORPORATION, New York, has been appointed to handle the national sales and installation of the Felpax lubricator of the Miller Felpax Company, Winona, Minn.

◆

W. PURDUE, consulting engineer of the Ramapo Ajax division of the American Brake Shoe & Foundry Company, Chicago, retired on May 1, but continues in an advisory capacity.

◆

THE INDEPENDENT PNEUMATIC TOOL COMPANY, Chicago, has opened a branch office at 1544 Broadway, Denver, Colo., with C. A. Turnquist in charge.

◆

JOSEPH T. RYERSON & SON, INC., Chicago, has reconstructed its plant at Cambridge, Mass., to increase the ground area occupied more than 30 per cent, and storage facilities to a greater extent.

◆

J. J. ALVES, JR., northeastern regional representative of the Railroad division of the Worthington Pump & Machinery Corp., Harrison, N. J., has taken over also the southeastern region, W. M. Vinnedge, formerly southeastern regional representative having resigned.

◆

EDWIN J. SCHWANHAUSSER, works manager at the Buffalo, N. Y., plant of the Worthington Pump & Machinery Corporation, Harrison, N. J., has been elected a vice-president. Mr. Schwanhausser, as vice-president and works manager, will continue in his present responsibilities.

◆

W. ROBERT TIMKEN has been appointed assistant to the president of The Timken Roller Bearing Company, Canton, Ohio. Since graduating from Harvard University in 1933, he has been active in the office and factory, serving in various capacities throughout the plant. He will continue his headquarters in the general office at Canton.

THE WHITING CORPORATION, Harvey, Ill., has moved its Chicago district sales office from the Franklin-Adams building to the Fisher Building at 343 South Dearborn Street.

◆

C. B. ROBINSON, general manager of the J. B. Ford Sales Company, Wyandotte, Mich., who has been connected with this company for 22 years has been elected president and W. F. Torrey, who has been connected with the company for six years, has been elected secretary-treasurer; both will serve on the board of directors.

◆

A. D. SHEERE, assistant division manager at Atlanta, Ga., of the A. M. Byers Company, Pittsburgh, Pa., has been appointed manager of the Houston, Texas, division office. W. B. Simpson, sales representative in the Pittsburgh division's northern territory, has been appointed assistant division manager, Atlanta, to succeed Mr. Sheere.

◆

ROY C. MUNRO, who for the past 14 years has been western sales manager of the Waugh Equipment Company, New York, has been elected vice-president, with office as heretofore at 310 South Michigan avenue, Chicago. Mr. Munro was born in 1884 at Annapolis Royal, Nova Scotia, Canada. In 1905 he moved to Chicago and attended the Armour Institute of Technology. After serving for several years in the mechanical department of the Pullman Company, Canadian Car & Foundry Co., and the Atchison, Topeka & Santa Fe, he went with the Union and Southern Pacific System as mechanical assistant in the purchasing department. In 1912, he was appointed a sales representative for the Acme Supply Company, Chicago. Five years later he became associated with the Chicago-Cleveland Car Roofing Company as sales representative and, when this organization was sold, he became connected with the Waugh Equipment Company as sales representative. In 1928 he was appointed western sales manager.

Roy C. Munro

GEORGE W. SINES, mechanical engineer of the Western-Austin Company, Aurora, Ill., has resigned to become affiliated with the Symington-Gould Corporation, Rochester, N. Y.

◆

J. E. BUCKINGHAM, formerly vice-president of the Lincoln Electric Railway Sales Company, has been elected vice-president in charge of all railway sales for the Portable Plating & Equipment Company, Chicago.

◆

C. N. KIRKPATRICK has been elected a vice-president of the Landis Machine Company, Waynesboro, Pa. Mr. Kirkpatrick continues also as secretary of the company. G. M. Stickell, assistant sales manager has been appointed sales manager.

◆

W. M. NONES has been elected chairman of the board of the Norma-Hoffmann Bearings Corporation, Stanford, Conn. O. P. Wilson has been elected president and treasurer; H. J. Ritter, vice-president and secretary, and C. B. Malone, vice-president in charge of plant operations.

◆

C. H. KUTHE has been appointed technical adviser to the Michigan division of Revere Copper & Brass, Inc., Detroit, Mich. Mr. Kuthe previously served in a sales and sales engineering capacity for the Timken Roller Bearing Company in the Philadelphia, Pa., district.

◆

WILLARD H. COBB, general factory manager, mechanical goods plants, United States Rubber Company, has been appointed general manager of the mechanical goods and general products division, including supervision of the manufacture of Lastex, yarn and rubber thread, with headquarters at New York.

◆

THE INTERNATIONAL NICKEL COMPANY has opened a new field office at 67 Wall street, New York, under the direction of J. W. Sands, whose duties will be to promote the use of nickel alloy steels and stimulate interest in the company's products.

◆

H. W. WOLFF, assistant director of purchases for the Westinghouse Air Brake Company and subsidiaries, including the Union Switch & Signal Co., has been promoted to director of purchases with headquarters, as formerly, at Wilmerding, Pa. He succeeds W. A. Forrester, who has retired after 49 years of continuous service with the Westinghouse Air Brake Company. Mr. Wolff was born near Elizabeth, N. J., and after being graduated from the local high school and business college, entered the employ of the Hall Switch & Signal Co., at Garwood, N. J. In a few years he rose to the position of purchasing agent, and thereafter successively held the positions of works manager, general man-

ager and treasurer, and was a member of the board of directors. After the Hall Company was absorbed by the Union Switch & Signal Co., in 1925, Mr. Wolff served the latter company in a general executive capacity. In 1937 he became assistant director of purchases of the Air Brake Company.

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MELVIN PATTISON, president and treasurer of the Industrial Brownhoist Corporation, Bay City, Mich., has been elected chairman of the board, and has been succeeded by Hoyt E. Hayes, vice-president. James B. Hayden, assistant sales manager, has been promoted to sales manager.

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R. S. WHARTON, general sales manager of the Quaker City Rubber Company, Philadelphia, Pa., has been promoted to vice-president in charge of sales to succeed F. C. Millhoff, who has retired. Mr. Wharton's headquarters are at Philadelphia. G. C. Johnson, manager of the Chicago branch, has been promoted to general sales manager, with headquarters at Philadelphia, and H. C. Heine, has been promoted to manager of the Chicago branch, with E. Asbridge as assistant.

◆

THE UNITED STATES STEEL CORPORATION of Delaware will open an executive office in Chicago, according to an announcement made by Benjamin F. Fairless, president, at a luncheon at the Blackstone Hotel on April 26. G. Cook Kimball, executive vice-president of the Carnegie-Illinois Steel Corporation, has been elected executive vice-president of the United States Steel Corporation at Chicago.

◆

WILLIAM J. KELLY, for many years traffic manager of The Baldwin Locomotive Works and subsidiary companies at Philadelphia, Pa., and Eddystone, has been promoted to the newly created position of manager of industrial relations. Craig Johnston, who has been on Mr. Kelly's staff in the traffic department for the past 20 years, has been appointed acting traffic manager.

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FOSTER E. WORTLEY, manager of The American Rolling Mill Company's Cleveland, Ohio, district sales office, has been appointed assistant manager of the midwestern sales area, with headquarters at Middletown, Ohio. Henry L. Woods, Jr., who has been attached to the Armco sales office at Detroit, Mich., as a salesman for the past 10 years, has been appointed manager of the Cleveland office to succeed Mr. Wortley.

Obituary

CHARLES NEHER, district sales manager of Templeton, Kenly & Co., Chicago, with headquarters at Dallas, Tex., died in that city on April 5.

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EARL L. COLOPY, sales representative in the eastern region of the Transportation Department of Johns-Manville Sales Corporation, New York, died at Jersey City Medical Center, Jersey City, N. J., on May 17, after a brief illness. Mr. Colopy was born at Lockport, N. Y., November 22, 1887, and entered the service of Johns-Manville in 1908 as a stenographer and since 1918, had served as a sales representative.

Personal Mention

General

W. D. QUARLES has been appointed general mechanical instructor of the Atlantic Coast Line, with system jurisdiction, at Rocky Mount, N. C.

EDWIN F. RICHARDSON, assistant engineer motive power of the Bessemer & Lake Erie, has been appointed assistant superintendent motive power, with headquarters as before at Greenville, Pa.

H. C. WYATT, assistant master mechanic of the Radford-Shenandoah divisions of the Norfolk & Western, has been appointed superintendent of the Shenandoah division with headquarters at Roanoke, Va.

EDWARD E. ROOT, master mechanic of the Morris and Essex division of the Delaware, Lackawanna & Western, with headquarters at Hoboken, N. J., has been appointed assistant chief of motive power, with headquarters at Scranton, Pa.

Master Mechanics and Road Foremen

L. E. LONERGAN, assistant master mechanic on the Southern Pacific at Roseville, Calif., has been appointed master mechanic of the Sacramento division, with headquarters at Sacramento, Calif., succeeding H. J. McCracken, deceased.

F. E. RUSSELL, JR., foreman of machinists of the Southern Pacific at Roseville, Calif., has been appointed assistant master mechanic at that point.

LELAND T. FIFE, master mechanic of the San Joaquin division of the Southern Pacific at Bakersfield, Calif., has been transferred to the Coast division, with headquarters at Bayshore, Calif. Mr. Fife was born on July 29, 1887, at Ogden, Utah, and received his education in the public schools of Ogden and through a correspondence-school course. He entered the employ of the Southern Pacific in July, 1905, serving as an engine wiper, a machinist helper, and an electric craneman until July 1, 1907. For the next four years he was a machinist apprentice at Ogden. From January, 1912, to September, 1912, he was a machinist and night foreman for the Utah Copper Company at Arthur, Utah; from October, 1912, to March, 1913, a machinist on the Chicago, Milwaukee & St. Paul; from October, 1913, to May, 1914, machine shop foreman, Bingham Garfield Railroad and Utah Copper Company, Magna, Utah, and from July, 1919, to November, 1919, a machinist on the Union Pacific at Provo, Utah, and North Platte, Neb. From December, 1920, until his recent appointment, he has been in the service of the Southern Pacific successively as a machinist, erecting foreman, department foreman, general foreman, assistant master mechanic of the Portland division, and master mechanic of the San Joaquin division. Mr. Fife was appointed to the latter position on August 1, 1937.

L. T. Fife

FREDERICK T. H. JAMES, general foreman of the Kingsland locomotive shops of the Delaware, Lackawanna & Western at Kingsland, N. J., has been promoted to the position of master mechanic at Hoboken, N. J., succeeding E. E. Root.

EDWIN E. HINCHMAN, who has been appointed master mechanic of the San Joaquin division of the Southern Pacific at Bakersfield, Calif., as noted in the April issue, was born on February 17, 1894, at San Francisco, Calif. He attended public schools, and from September 3, 1912, to April 30, 1926, was a draftsman in the motive-power department, general office, of the Southern Pacific. From May 1, 1926, to June 15, 1936, he was dynamometer engineer on locomotive efficiency tests—about five years on road tests, and in the general office at 65 Market street, San Francisco, on various duties in the

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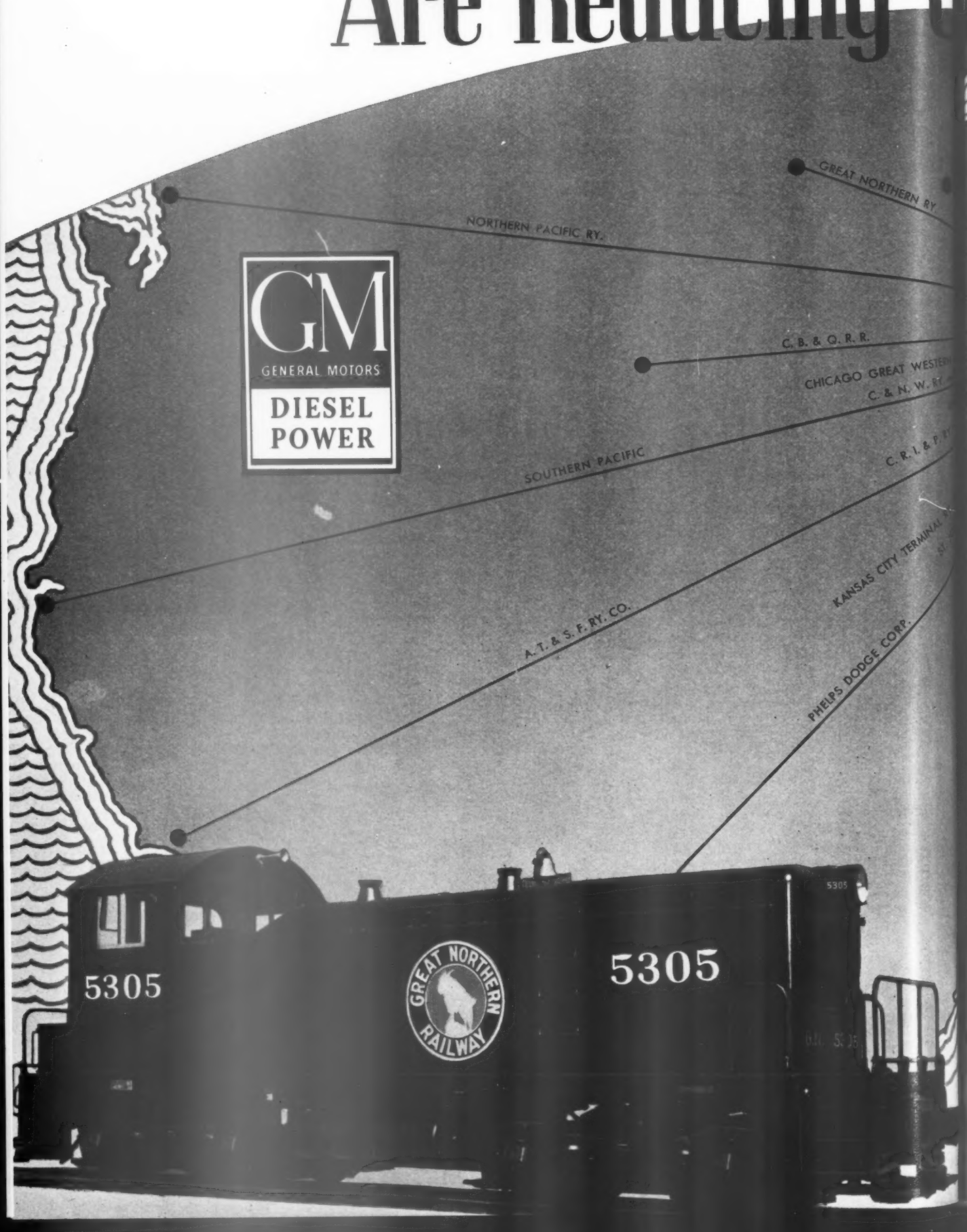
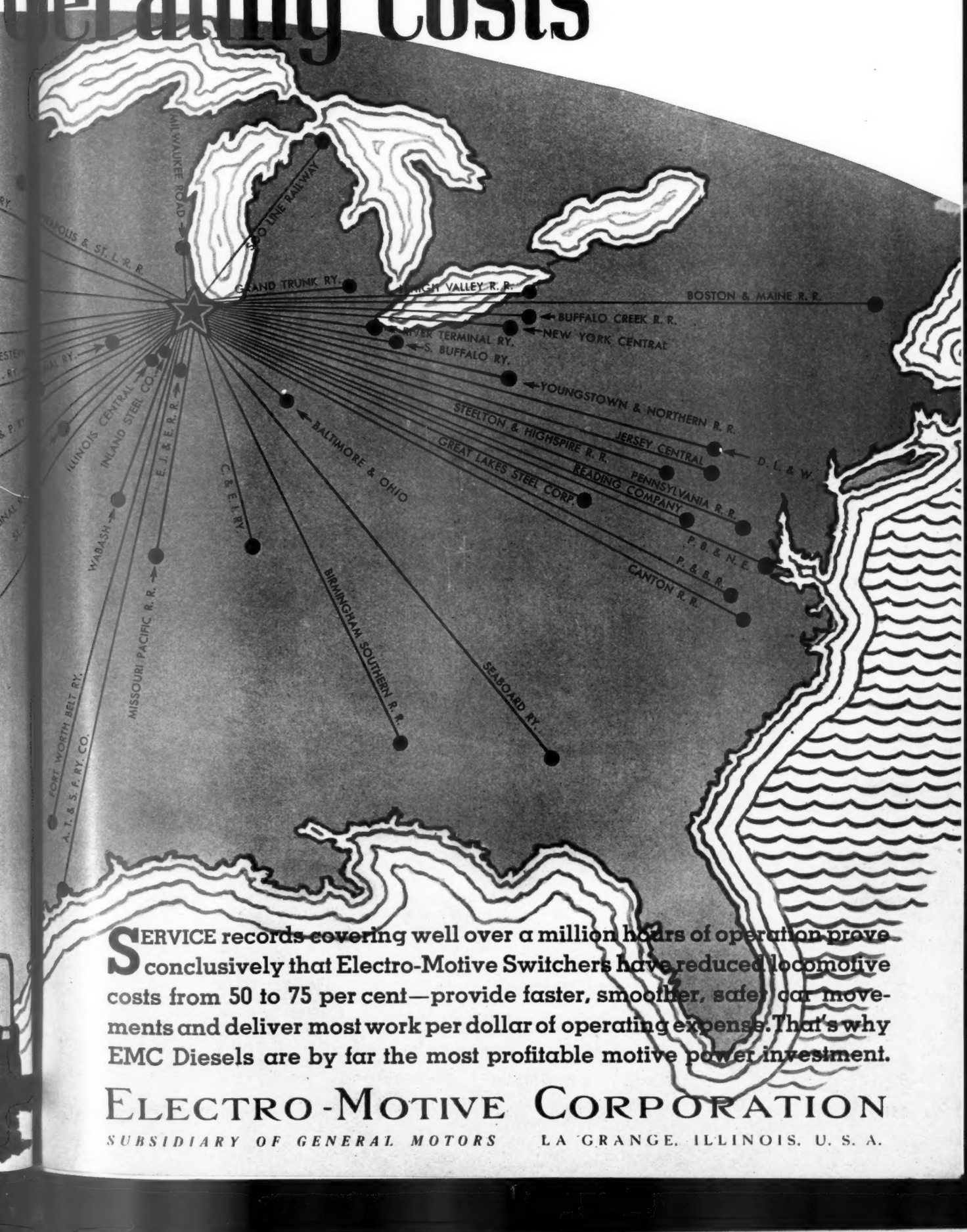
From Coast to Coast

Are Reducing Co



EMC Diesel Switchers
Operating Costs



SERVICE records covering well over a million hours of operation prove conclusively that Electro-Motive Switchers have reduced locomotive costs from 50 to 75 per cent—provide faster, smoother, safer car movements and deliver most work per dollar of operating expense. That's why EMC Diesels are by far the most profitable motive power investment.

ELECTRO-MOTIVE CORPORATION

SUBSIDIARY OF GENERAL MOTORS LA GRANGE, ILLINOIS, U. S. A.

motive-power department. He was promoted to the position of assistant master mechanic at Roseville, Calif., on June 16, 1936. He was transferred to West Oakland, Calif., on October 1, 1938, and became master mechanic at Bakersfield on April 1, 1939.

C. E. POND, general foreman foundries, Roanoke, Va., shops of the Norfolk & Western, has been appointed assistant master mechanic, succeeding H. C. Wyatt.

Car Department

O. A. WALLACE has been appointed general car foreman of the Atlantic Coast Line, with headquarters at Wilmington, N. C.

W. R. SMITH, leading hand-car foreman of the Canadian National at Nutana, Sask., has been appointed acting car foreman at Watrous, Sask.

A. M. MCLENNAN, car foreman of the Canadian National at Watrous, Sask., has been appointed coach foreman at Saskatoon, Sask.

S. J. FULLER, mechanical draftsman on the St. Louis Southwestern at Pine Bluff, Ark., has been promoted to the position of general car foreman, with headquarters at Pine Bluff, succeeding George S. Beaumont, deceased.

Shop and Enginehouse

J. L. BARTLE, boiler foreman of the Canadian National at Prince Albert, Sask., has retired.

E. S. THOMPSON, boilermaker of the Canadian National at Kamloops Jct., B. C., has become boiler foreman at Prince Albert, Sask.

CHARLES A. MARSHALL has been appointed acting night locomotive foreman of the Canadian National at Point Tupper, N. S., succeeding Stephen J. McDonald.

GEORGE HOWARD, apprentice class instructor of the Canadian National at Transcona, Man., has been appointed supervisor of apprentices, Western Region.

ERNEST LEAMAN has been appointed acting assistant foreman, paint department, motive power shops, of the Canadian National, at Moncton, N. B., succeeding Wm. Carter, deceased.

L. F. BRADLEY, laboratory engineer in the test department of the Erie at Meadville, Pa., has been promoted to the position of general foreman, at Jamestown, N. Y.

G. L. FISHER, general foreman of the Erie at Jamestown, N. Y., has been promoted to the position of general foreman at Binghamton, N. Y., succeeding J. P. Moffitt, deceased.

L. A. HARTLEY, machinist leader of the Erie at Hornell, N. Y., has been promoted to the position of general locomotive inspector, district master mechanic's staff, at Meadville, Pa., succeeding H. E. Durtsche, retired.

JOSEPH B. CARROLL, foreman of the electrical shop of the Delaware, Lackawanna & Western at Kingsland, N. J., has been promoted to general foreman of the Kingsland locomotive shop, succeeding F. T. H. James.

Purchasing and Stores

C. I. CASWELL has been appointed division storekeeper of the Saratoga and Champlain divisions of the Delaware & Hudson, with headquarters at Colonie, N. Y., succeeding M. W. Farrell, deceased.

WALTER R. OWEN, assistant purchasing agent of the Chicago, Rock Island & Pacific at Chicago, has been promoted to purchasing agent, with the same headquarters, succeeding Frank D. Reed, deceased.

Obituary

W. A. COTTON, mechanical assistant of the Erie, with headquarters at Cleveland, Ohio, died on May 2.

GEORGE S. BEAUMONT, general car foreman of the St. Louis Southwestern, with headquarters at Pine Bluff, Ark., died at that point of April 17.

H. J. MCCRACKEN, master mechanic of the Sacramento division of the Southern Pacific, with headquarters at Sacramento, Cal., died at that point on April 16.

FRANK D. REED, purchasing agent of the Chicago, Rock Island & Pacific, with headquarters at Chicago, died at his home in that city on April 23, after a long illness.

ARTHUR L. TUCKER, who retired in 1926 as assistant general storekeeper on the Chicago & North Western, with headquarters at Chicago, died suddenly of a heart attack on April 17, at Cocoa Beach, Fla.

JOHN J. O'BRIEN, who retired on July 1, 1937, as superintendent of the car department of the Terminal Railroad Association of St. Louis, died on May 5 at the Missouri Pacific hospital in St. Louis, Mo.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers. State the name and number of the bulletin or catalog desired, when mentioned in the description.

SAFETY SHOES.—Lehigh Safety Shoe Co., Allentown, Pa. Stock catalog containing technical information and illustrations of steel-toe safety work shoes for various industries.

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RETROL.—Filtrol Corporation, 315 West Fifth street, Los Angeles, Calif. 16-page booklet, in colors, "Retrol and Its Use in the Re-refining of Used Oils."

◆

HANNA STOKER.—The Hanna Stoker Co., Cincinnati, Ohio. "The Hand that Holds the Profits Writes the Checks," an attractive, spiral-bound booklet descriptive of the Hanna stoker, with illustrations of its installation and of equipment on which it is installed.

◆

FLEXIBLE METAL TUBING.—The American Brass Company, American Metal Hose Branch, Waterbury, Conn. Bulletin SS-25. Discusses use of seamless flexible metal tubing for conveying steam, liquids, gases; control of vibration, the connecting of misaligned and moving parts, etc. Engineering data; specifications; installation rules.

DUAL WHEELS.—Budd Wheel Company, Detroit, Mich. Thirty-six page catalog, B39-2. Construction and application of Budd single and dual wheels, their servicing and replacement.

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MATERIALS - HANDLING EQUIPMENT.—Lewis-Shepard Sales Corporation, 286 Walnut street, Watertown (Boston), Mass. An illustrated folder descriptive of Lewis-Shepard line of materials handling equipment and the new Celoron wheels for floor protection.

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SCULLY STOCK LIST AND REFERENCE BOOK, 1939.—Scully Steel Products Company, 1319 Wabansia avenue, Chicago. A spiral-bound, thumb-indexed book for convenience in ordering material.

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CAR PULLERS, HOISTS AND WINCHES.—Stephens-Adamson Mfg. Co., Aurora, Ill. Eight page catalog. Specifications, dimensions and engineering information on how to select proper car puller.

◆

THE STORY OF AIR CONDITIONING.—Air Conditioning Manufacturers' Association, Southern Building, Washington, D. C. Twelve-page booklet illustrated in Disney cartoon style. Graphically describes four hypothetical characters personifying temperature, humidity, cleanliness, and air motion, the elements to be controlled in air conditioning.